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Not shared with anyone

Sections: 26, Sub-sections: 286,
Questions: 1409.
Questions with enabling conditions: 0
Questions with validation conditions:1386
Rosters: 0
Variables: 286

Balt_ADAPT Expert Assessment

SURVEY IDENTIFICATION INFORMATION
QUESTIONNAIRE DESCRIPTION

QUESTIONNAIRE FISH
No sub-sections, No rosters, No questions.

WELCOME!
No sub-sections, No rosters, No questions, Static texts: 1.

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD
Sub-sections: 13, No rosters, Questions: 64, Static texts: 54, Variables: 13.

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 53, Variables: 13.

WITTLING - WHITING (MERLANGIUS MERLANGUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 53, Variables: 13.

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 52, Variables: 13.

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 51, Variables: 13.

HORNHECHT - GARFISH (BELONE BELONE)
Sub-sections: 13, No rosters, Questions: 64, Static texts: 51, Variables: 13.

SURVEY IDENTIFICATION INFORMATION QUESTIONNAIRE DESCRIPTION

Basic information

Title Balt_ADAPT Expert Assessment

WELCOME!

intro

STATIC TEXT

Welcome to our questionnaire!

Please score the vulnerability of each fish species according to the given infomation and based on your individual expert knowledge for each sensitivity attribute. Once all the values for each sensitivity attribute are filled, the attribute color should change from blue to green, allowing you to score the next sensitivity attribute.

Please also score the data quality for the given fish species by using the given color coding. These color coding indicate the study area of the reference as followed:

Western Baltic = dark blue
Central Baltic/Kattegat-Skagerrak = light blue
North Sea = yellow
North Atlantic/Atlantic = orange
Mediterranean/not specified = red

If you have any questions, please contact: dorothee.moll@thuenen.de, patrick.polte@thuenen.de

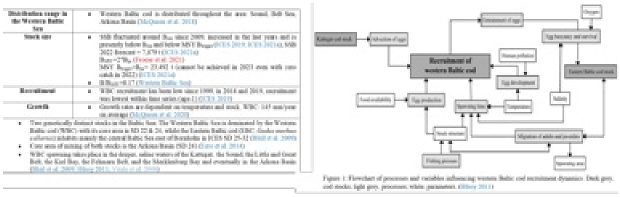
For technical questions: guilherme.pinto@idiv.de

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

cod

STATIC TEXT

Additional Information:



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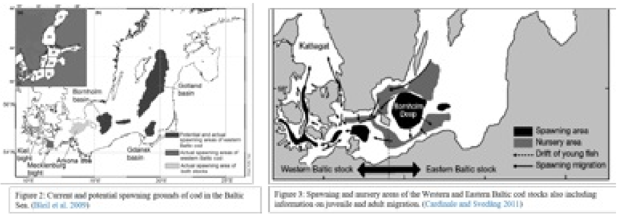
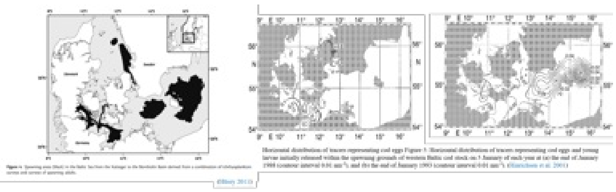


STATIC TEXT



STATIC TEXT

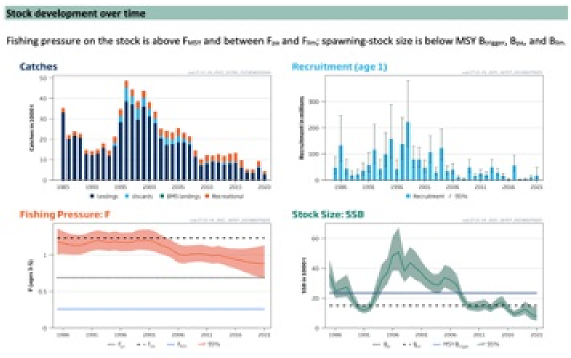


Figure 1 Cod in subdivisions 22–24, western Baltic stock. Summary of the stock assessment. BMS landings (fish below the minimum conservation reference size [MCRS]) have been included since 2017.

(ICES 2021a)

Table 1 Cod in subdivisions 22–24, western Baltic stock. State of the stock and fishery relative to reference points.

		Fishing pressure					Stock size			
		2016	2017	2018			2017	2018	2019	
Maximum sustainable yield	F_{MSY}	✗	✗	✗	Above	MSY $B_{trigger}$	✗	✗	✗	Below trigger
Precautionary approach	F_{pa}/F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	✗	○	○	Increased risk
Management plan	F_{ranges}	✗	✓	✓	Within range	MSY $B_{trigger}$	✗	✗	✗	Below trigger

(ICES 2019)

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• *Spawning: Salinity 18-33 psu, temperature > 2°C, oxygen > 2ml/l (Hinrichsen et al. 2012, von Westernhagen 1970)*
• *Eggs: Salinity > 20 psu, temperature 4-8.5°C (Hüssy et al. 2012 and references therein)*
• *Juveniles: Nearshore benthic habitats are possible key environments by pelagic and demersal stages of 0-group cod (Hüssy et al. 1997)*
• *Adults: Main feeding grounds in shallow water < 20m but temperature restricted (Funk et al. 2020a)*
• *Juveniles & Adults: Show seasonality in depth use. WBC (Western Baltic cod) favors shallow areas < 20 m, spring and autumn < 10 m (Funk et al. 2020b)*

Low | NUMERIC: INTEGER | cod_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [1]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | cod_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [2]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | cod_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [3]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | cod_hab_vhigh

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [4]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

VARIABLE | LONG | sum_cod_hab

`(cod_hab_low+cod_hab_mod+cod_hab_high+cod_hab_vhigh)`

STATIC TEXT

E `sum_cod_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — cod_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

PREY SPECIFICITY

E `sum_cod_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Juveniles: ontogenetic feeding shift from planktonic prey to benthic prey at 6 cm cod size (Funk 2017), 4-5 cm (Zarkeschwari 1977), 5-7 cm (Hüssy et al. 1997)
• < 4cm exclusively on pelagic prey (copepods, cladocerans) (Hüssy et al. 1997)
• 4-5 cm copepods dominate but also benthic prey appears (mysids, amphipods) (Hüssy et al. 1997)
• 5-7 cm dominant mysids and amphipods, with copepods minor (Hüssy et al. 1997)
• 7-16 cm exclusively benthic prey with increased prey diversity (Hüssy et al. 1997)
• Preferred copepod prey species have changed over the years probably due to changed availability (stomach content analysis Funk 2017, Zarkeschwari 1977)
• Adults: benthic/ demersal feeders, diverse crustaceas, annelida, echinodermata, diverse fish species: pleuronectiformes, ammodytidae, gobidae; also cannibalistic! (Funk et al. 2020a; Pachur and Horbowy 2013)
• common shore crab main prey type in shallow feeding areas – SD 22
• clupeids main prey type in deeper areas – Arkona Basin
• food composition varies seasonally (Funk et al. 2020a; Pachur and Horbowy 2013)

Low

NUMERIC: INTEGER — cod_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [5]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — cod_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [6]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — cod_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [7]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — cod_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [8]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(cod_prey_low+cod_prey_mod+cod_prey_high+cod_prey_vhigh)`

LONG — sum_cod_prey

STATIC TEXT

E `sum_cod_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: — NUMERIC: INTEGER — `cod_prey_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

ADULT MOBILITY

E `sum_cod_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Cod populations with different degree of migration and philopatry (sedentary residents vs. seasonal migrants vs. dispersers) 40 – 200 km (Robichaud and Rose 2004), the pattern of resident vs. migratory behavior was also observed for cod in Skagerrak- Kattegat (Svedäng et al. 2007)
• WBC (Western Baltic cod) stay in close proximity to the coast and shallow areas all year round < 50 m (Haase, 2021), daily travelled distances 0.7-4.7 km (Haase, 2021)

Low — NUMERIC: INTEGER — `cod_mob_low`

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [9]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — `cod_mob_mod`

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [10]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — `cod_mob_high`

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [11]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `cod_mob_vhigh` _
VARIABLE `(cod_mob_low+cod_mob_mod+cod_mob_high+cod_mob_vhigh)`	LONG `sum_cod_mob`

STATIC TEXT

E `sum_cod_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `cod_mob_dtq` _

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

DISPERSAL OF EARLY LIFE STAGES

E `sum_cod_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Eggs: Pelagic eggs: Hatching 17-22 days after spawning (depending on temperature; Thompson and Riley 1981, Wieland et al. 1994), drifting approx. 3 months (Hinrichsen et al. 2001)
• Eggs dispersal by currents (Hüssy 2011)
• Larvae: Larvae are transported to shallow water regions, where they settle as juveniles (Voss et al. 1999), drifting within the upper water masses, vertically depending on their buoyancy (Grønkjær and Wieland 1997; Hinrichsen et al. 2001)
• Drift 40 – 200 km (Hinrichsen et al. 2003)
• During mild winters (low air pressure systems with westerly winds) WBC (Western Baltic cod) ELS drift into Arkona and Bornholm Basin (ca. 200 km) (Hinrichsen et al. 2001)
• During cold winters (high air pressure with easterly winds), retention of eggs, larvae and juveniles within their original spawning grounds may predominate (Hinrichsen et al., 2001)
• See Figure 5 for more information on horizontal distribution of eggs and larvae

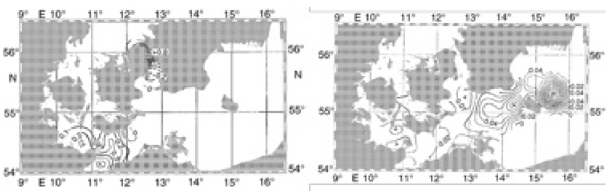


Figure 5: Horizontal distribution of tracers representing cod eggs and young larvae initially released within the spawning grounds of western Baltic cod stock on 5 January of each year at (a) the end of January 1988 (contour interval 0.01 nm^{-2}), and (b) the end of January 1993 (contour interval 0.01 nm^{-2}). (Hinrichsen et al. 2001)

Low

NUMERIC: INTEGER — cod_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [12]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — cod_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [13]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — cod_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [14]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — cod_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [15]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(cod_els_low+cod_els_mod+cod_els_high+cod_els_vhigh)`

LONG — sum_cod_els

STATIC TEXT

E `sum_cod_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — cod_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_cod_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Eggs: salinity > 20 psu, temperature 4-8.5°C (Hüssy et al. 2012 and references therein)
• Egg survival depends on oxygen (Köster et al. 2001) and predation by clupeids (Köster and Möllmann, 2000)
• Eggs: threshold ambient water temperature >2 and <10 °C (Hinrichsen et al. 2012; von Westernhagen 1970), ideal 4-8°C (von Westernhagen 1970), < 15 ‰ salinity threshold for egg buoyancy (von Westernhagen 1970)
• Larvae: above halocline, concentrating in depths ~25-40 m (Voss et al. 1999)
• First-feeding 4-8 days after hatch (Fossum 1986)
• Ten days after hatching larvae start active feeding (Hinrichsen et al. 2001)
• Larvae are transported to shallow water regions, where they settle as juveniles (Voss et al. 1999), larvae are migrating vertically through halocline into less saline shallow water for feeding (Grønkjær and Wieland 1997)
• Transition from pelagic (drifting approx. 3 months) to demersal life (Hinrichsen et al. 2001)
• Larvae & juveniles depend on availability of mesozooplankton (Voss et al. 2003), before prey-switch (< 6 cm) they feed on cladocerans, copepods ostracodes, bivalves (size-dependent prey choice) (Funk 2017, Funk and Möllmann 2021)
• High survival of larvae dependent on high food abundance of calanoid copepods (Hinrichsen et al. 2003)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [16] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_ssr_low ______________________________
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [17] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_ssr_mod ______________________________
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [18] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_ssr_high ______________________________
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [19] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_ssr_vhigh ______________________________
VARIABLE `(cod_ssr_low+cod_ssr_mod+cod_ssr_high+cod_ssr_vhigh)`	LONG sum_cod_ssr

STATIC TEXT

E `sum_cod_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER cod_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_cod_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Batch spawner (Hüssy 2011 and references therein, Nissling and Westin 1997)
• Spawning areas: deep, saline waters below 20-40 m (Hüssy 2011)
• Some degree of natal homing (Hüssy 2011)
• Cod males (Belt Sea cod) require >14-15 psu to activate spermatozoa, fixed stock specific characteristic (Nissling and Westin 1997)
• Cod females (Belt Sea cod) require 19-21 psu for neutral egg buoyancy (Nissling and Westin 1997)
• Spawning time and duration influenced by temperature (with later and more prolonged spawning in cooler years; Hüssy 2011) and salinity (Kändler 1950 cited in Hüssy 2011)
• Laboratory: no spawning at salinities < 15 ‰ (Bleil 1995)

Low

NUMERIC: INTEGER cod_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER cod_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER cod_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER cod_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (cod_crs_low+cod_crs_mod+cod_crs_high+cod_crs_vhigh)	LONG sum_cod_crs

STATIC TEXT

E `sum_cod_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — cod_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

POPULATION SPAWNING CYCLE

E `sum_cod_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Spawning period of WBC (Western Baltic cod): begin-Jan to end-May (Bleil et al. 2009; Hüssy 2011 and references therein; Funk and Möllmann 2021)
• Entire spawning season may last 7 months, peak spawning 1-2 months (Hüssy 2011 and references therein)

Low — NUMERIC: INTEGER — cod_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur
And 49 other symbols [20]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — cod_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [21]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [22]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `cod_spw_high`

Very high

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [23]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `cod_spw_vhigh`

VARIABLE

`(cod_spw_low+cod_spw_mod+cod_spw_high+cod_spw_vhigh)`

LONG — `sum_cod_spw`

STATIC TEXT

E `sum_cod_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `cod_spw_dtq`

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_cod_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Eggs: Range egg survival in Western Baltic Sea: 4-8.5 °C (Hüssy 2011 and references therein), with extreme temperature conditions < 2°C and > 10 °C negatively effecting hatching success, development and increased deformities (von Westernhagen 1970)
• Cross-effect with salinity and oxygen: eggs tolerate lower salinity and lower oxygen if temperatures are low (von Westernhagen 1970; Wieland et al., 1994)
• Adults: starvation during summer periods/depressed feeding activity – restricted to specific habitats to stay within temperature tolerance limits (Funk et al. 2020a; Funk et al. 2020b; Funk and Möllmann 2021)
• Atlantic cod in general (considering pan-Atlantic distribution) inhabits waters with temperatures ranging from -1°C - 20°C, usually within a range of 0-12°C (Drinkwater 2005), thermal niche general: -1.5°C – 19°C, spawning season: 1°C-8°C (Righton et al. 2010)
• WBC (Western Baltic cod) experience 0°C – 17 °C, mean: 6 ± 2 °C, spawning temperature: 7 ± 2 °C (Righton et al. 2010)
• Higher than average seas temperatures are correlated with low recruitment of cod (O'Brien et al. 2000; Planque and Frédou 1999)

• *Cod (in general) will likely spread northwards in terms of climate change (Drinkwater 2005)*
• *Sensitivity to phenological changes: rising sea temperatures may cause shift in spawning phenology (McQueen and Marshall 2017)*

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [24] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_stt_low ________________________________
Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [25] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_stt_mod ________________________________
High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [26] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_stt_high ________________________________
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [27] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_stt_vhigh ________________________________
VARIABLE `(cod_stt_low+cod_stt_mod+cod_stt_high+cod_stt_vhigh)`	LONG sum_cod_stt

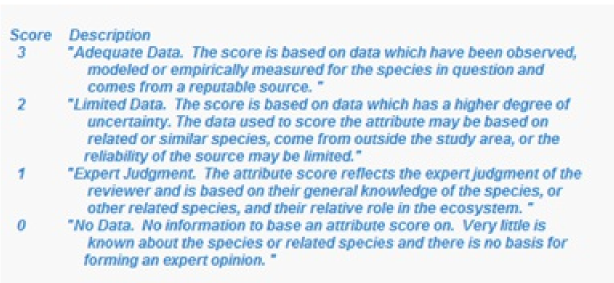
STATIC TEXT

E `sum_cod_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER cod_stt_dtq ________________________________

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

SENSITIVITY TO DECREASING SALINITY

`sum_cod_stt == 5`

E

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• < 15 ‰ salinity threshold for egg buoyancy (von Westernhagen 1970)
• < 20 -22 psu eggs sink to bottom where they fail to develop (von Westernhagen et al. 1988 cited in Hüssy et al. 2012)
• Cod males (Belt Sea cod) require >14-15 psu to activate spermatozoa, fixed stock specific characteristic (Nissling and Westin 1997)
• cod females (Belt Sea cod) require >19-21 psu for neutral egg buoyancy (Nissling and Westin 1997)

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_sts_low _
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [28] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_sts_mod _
High I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [29] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_sts_high _
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [30] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER cod_sts_vhigh _
VARIABLE `(cod_sts_low+cod_sts_mod+cod_sts_high+cod_sts_vhigh)`	LONG sum_cod_sts

STATIC TEXT

E `sum_cod_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	cod_sts_dtq
V1 `self.InRange(0,3) || self == null`		
M1 Value must be between 0 and 3		

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_cod_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• no data/information

Low	NUMERIC: INTEGER	cod_sta_low
I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [31]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		
Moderate	NUMERIC: INTEGER	cod_sta_mod
I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [32]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		
High	NUMERIC: INTEGER	cod_sta_high
I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [33]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		
Very high	NUMERIC: INTEGER	cod_sta_vhigh
I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [34]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		
VARIABLE `(cod_sta_low+cod_sta_mod+cod_sta_high+cod_sta_vhigh)`	LONG	sum_cod_sta

STATIC TEXT

E `sum_cod_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER cod_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

POPULATION GROWTH RATE

E `sum_cod_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• F_{MSY}=0.26; F_{pa}= 0.69 (ICES 2021b) • r=0.52-0.69 (Western Baltic Sea)
Von Bertalanffy K	• 0.11 (McQueen et al. 2018)
Age at maturity (t_m)	• 2 (Froese and Pauly 2021; ICES 2021b)
Maximum age (t_{max})	• 25 (ICES 2021b)
Natural mortality (M)	• Age 0 and 1: >0.5; older 0.13-0.5 (ICES 2021b)
Maximum length (L_{max})	• 155 cm TL (McQueen et al. 2018)

Low

NUMERIC: INTEGER cod_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum

And 30 other symbols [35]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER cod_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.

And 60 other symbols [36]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER cod_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25

And 88 other symbols [37]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [38]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER cod_pgr_vhigh

VARIABLE
`(cod_pgr_low+cod_pgr_mod+cod_pgr_high+cod_pgr_vhigh)`

LONG sum_cod_pgr

STATIC TEXT

E `sum_cod_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER cod_pgr_dtq

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

SENSITIVITY TO OTHER STRESSORS

E `sum_cod_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Low oxygen < 5ml/l egg survival drops sharply, no eggs survive < 2ml/l (Wieland et al. 1994, Hüssy et al. 2012 and referenced therein)
• During summer risk to be exposed to/ trapped at low oxygen conditions near the coast (pers. comm. Funk 2021)
• Natural predators: harbor porpoise: 26-36 % diet composition (Andreasen et al. 2017), grey seals: 15 % diet composition (Hoffmann 2019, not publ.), habour seals: 43 % diet composition (Andersen et al. 2007), cormorants: 44% diet composition (Andersen et al. 2007)

Low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [39]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER cod_ost_low

Moderate I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen, [And 321 other symbols [40]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------------	cod_ost_mod
High I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen, [And 321 other symbols [41]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------------	cod_ost_high
Very high I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda [And 315 other symbols [42]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------------	cod_ost_vhigh
VARIABLE `(cod_ost_low+cod_ost_mod+cod_ost_high+cod_ost_vhigh)`	LONG	sum_cod_ost

STATIC TEXT

E `sum_cod_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER -------------------------------------	cod_ost_dtq

DORSCH - ATLANTIC COD (GADUS MORHUA) – FOCUS ON WESTERN BALTIC COD

DIRECTION OF EFFECTS

E `sum_cod_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER -------------------------------------	cod_doe_pos

Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER cod_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER cod_doe_neg
VARIABLE (cod_doe_pos+cod_doe_neu+cod_doe_neg)	LONG sum_cod_doe

STATIC TEXT

E `sum_cod_doe != 4`

The attribute direction of effect must have a sum of 4

Comments:	TEXT cod_com

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

herring

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Eastern part of North Sea, Skagerrak-Kattegat, Öresund, along the Western Baltic Sea around Rügen (SD 22, 23, 24) (ICES 2020; Nielsen et al. 2001)
Stock size	• The stock has decreased consistently from mid 2000s to a historical low in 2019, with the new B_{lim} (120 kt) the stock has been in a state of impaired recruitment since 2007 (ICES 2020) • SSB decreased constantly during the second half of the 2000s, lowest value was about 70,000 t in 2011, has been below B_{lim} since 2007 (ICES 2020) • B_{MSY}=2*B_{pa} (Froese et al. 2021) • MSY $B_{trigger}$=B_{pa}= 150,000 t; SSB(2021)= 65,046 t (ICES 2021), B/B_{MSY}=0.22 (Western Baltic Sea)
Recruitment	• Recruitment decreased since mid-2000s • Decline in the last five years with a historical low value in 2019 of 778,899 thousands (ICES 2020)
Growth	• Western Baltic larvae: 0.13-0.26 mm/d (4.8-11.2°C) (Weber 1971); 0.21-0.25 mm/d (8°C) (Klinkhardt 1986a; Oeberst et al. 2009) • Larvae from Archipelago Sea: growth rate differed between areas: 0.18-0.52 mm/d (depending on temp.): increase of 1°C= increase in growth rate of 0.043 mm/d (Hakala et al. 2003)

• Two different spawning forms in Western Baltic Sea: Autumn and spring herring (Parmanne et al. 1994)
• Successful reproduction throughout the entire Baltic Sea (different populations) (Ojaveer 1981)

STATIC TEXT

Stock development over time

Fishing pressure on the stock is below F_{MSY}, F_{pa}, and F_{lim}; spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

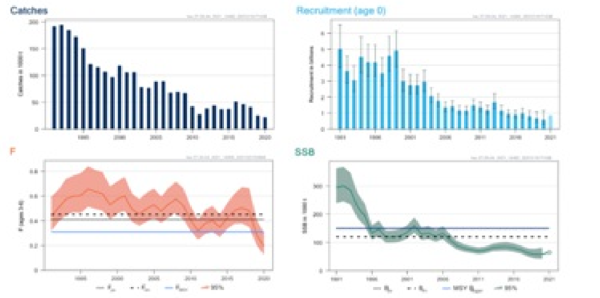


Figure 1 Herring in subdivisions 20–24, spring spawners. Commercial catches, recruitment, fishing mortality (F), and spawning-stock biomass (SSB) from the summary of the stock assessment; 95% confidence intervals are shown for SSB, F, and recruitment. The 2021 recruitment bar shaded in a lighter colour is the average value of 2015–2019, and the grey diamond in the SSB plot is a predicted number for 2021.

(ICES 2021)

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Herring rely on inshore, transitional waters (estuaries, lagoons, bays) for spawning and larval retention (Western Baltic Sea) (Polte et al. 2017)
• Litho-phytophilous spawner (Balon 1975), spawning on benthic substrates in 1-5 m water depth, according to distribution of vegetation
• Occurrence water depth: Spawning in 1-5 m, according to distribution of vegetation (Klinkhardt 1996; Kotterba et al. 2014; Scabell 1988)

Low	NUMERIC: INTEGER her_hab_low
I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul And 124 other symbols [43] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	_________________________________

Moderate I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts And 19 other symbols [44] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ____________	her_hab_mod
High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [45] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ____________	her_hab_high
Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [46] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ____________	her_hab_vhigh
VARIABLE `(her_hab_low+her_hab_mod+her_hab_high+her_hab_vhigh)`	LONG	sum_her_hab

STATIC TEXT

E `sum_her_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ____________	her_hab_dtq

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

PREY SPECIFICITY

E `sum_her_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Adults are zooplanktivorous, autumn herring also prey on gobies (Western Baltic Sea) (Kotterba 2015)*
- *Central Baltic: dominate prey item: Pseudocalanus sp. (Möllmann et al. 2004)*

Low

NUMERIC: INTEGER her_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [47]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER her_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [48]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER her_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [49]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER her_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [50]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(her_prey_low+her_prey_mod+her_prey_high+her_prey_vhigh)`

LONG sum_her_prey

STATIC TEXT

E `sum_her_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER her_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

ADULT MOBILITY

E `sum_her_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Highly migratory between summer feeding grounds in Skagerrak-Kattegat and inshore coastal waters along the Western Baltic coastline (Jönsson and Biester 1981; Poulsen et al. 2000)

Low

NUMERIC: INTEGER — `her_mob_low`

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [51]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `her_mob_mod`

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [52]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `her_mob_high`

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [53]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `her_mob_vhigh`

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(her_mob_low+her_mob_mod+her_mob_high+her_mob_vhigh)`

LONG — `sum_her_mob`

STATIC TEXT

E `sum_her_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — `her_mob_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_her_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

- *Benthic eggs: development time (depends on temperature): 12 days at 10°C (Klinkhardt 1984a; Peck et al. 2012)*
- *Larvae remain in inshore nursery areas: active habitat selection (Polte et al. 2017)*

Low

NUMERIC: INTEGER — her_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [54]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — her_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [55]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — her_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [56]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — her_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [57]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(her_els_low+her_els_mod+her_els_high+her_els_vhigh)`

LONG — sum_her_els

STATIC TEXT

E `sum_her_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER her_els_dtq -

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_her_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Duration of yolk-sac stage: 6.5 days at 8 °C (Klinkhardt 1996), critical first feeding period*
- *At sizes 25-30 mm, schooling behavior, migration to outer coastal areas (Blaxter and Hunter 1982; Klinkhardt 1996)*
- *Western Baltic larvae feeding on zooplankton (copepods, nauplii and copepodite stages) (Paulsen 2016; Paulsen et al. 2014)*

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [58] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER her_ssr_low -
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [59] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER her_ssr_mod -
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [60] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER her_ssr_high -
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [61] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER her_ssr_vhigh -
VARIABLE `(her_ssr_low+her_ssr_mod+her_ssr_high+her_ssr_vhigh)`	LONG sum_her_ssr

STATIC TEXT

E `sum_her_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER her_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_her_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonadal development or initial spawning).

STATIC TEXT

• *Demersal eggs attached to substrates (Polte et al. 2014; Scabell 1988)*
• *Bet-hedging strategists, spreading spawning in waves over time (Arula et al. 2014; Lambert and Ware 1984)*
• *Cohorts with different survival bottlenecks (first cohort: bottleneck on larval stage, second cohort: bottleneck on egg stage) (Polte et al. 2014)*
• *Initial spawning is triggered by temperature (threshold 4°C) (Polte et al. 2021)*
• *Specific vegetated spawning areas serve as important nurseries (Moll 2018)*
• *Precise homing to natal spawning areas with straying behavior (Moll et al. in prep., personal communication)*

Low — NUMERIC: INTEGER her_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER her_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER her_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high — NUMERIC: INTEGER her_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG sum_her_crs

`(her_crs_low+her_crs_mod+her_crs_high+her_crs_vhigh)`

STATIC TEXT

E `sum_her_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: | NUMERIC: INTEGER | `her_crs_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

POPULATION SPAWNING CYCLE

E `sum_her_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Spring spawning population, spawning time from March-May

Low | NUMERIC: INTEGER | `her_spw_low`

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
[And 49 other symbols [62]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | `her_spw_mod`

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
[And 105 other symbols [63]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | `her_spw_high`

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
[And 204 other symbols [64]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | her_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [65]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE | LONG | sum_her_spw

`(her_spw_low+her_spw_mod+her_spw_high+her_spw_vhigh)`

STATIC TEXT

E `sum_her_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | her_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_her_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Threshold spawning: 4°C (Polte et al. 2021)*
- *Egg development: 7-13 °C*
- *Atlantic herring: upper thermal limit for viable eggs is about 10-12°C (Blaxter and Hunter 1982)*
- *Temperature optimum: 5-17°C successful hatching (Peck et al. 2012)*
- *Larvae: > 17°C (heart problems) (Moyano et al. 2020)*
- *Smaller size of hatched larvae at higher temperatures (Peck et al. 2012)*
- *Sensitivity to phenological changes: During warm winter periods: shift in spawning phenology/time (earlier spawning) (Polte et al. 2021), mismatch of prey items*

Low | NUMERIC: INTEGER | her_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [66]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER her_stt_mod

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [67]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER her_stt_high

I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [68]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER her_stt_vhigh

I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [69]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(her_stt_low+her_stt_mod+her_stt_high+her_stt_vhigh)`

LONG sum_her_stt

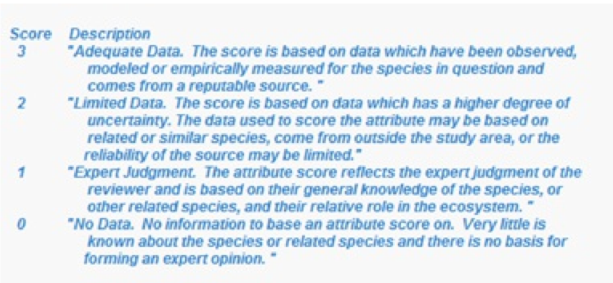
STATIC TEXT

E `sum_her_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER her_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_her_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *High salinity tolerance 4-35 psu (Klinkhardt 1986a; Klinkhardt 1986b), threshold egg survival: >4 psu (Klinkhardt 1984b)*
- *Larvae: critical values 2-3 psu (Illing et al. 2016)*

Low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — her_sts_low

Moderate

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne

And 3 other symbols [70]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — her_sts_mod

High

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r

And 27 other symbols [71]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — her_sts_high

Very high

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if

And 28 other symbols [72]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — her_sts_vhigh

VARIABLE

`(her_sts_low+her_sts_mod+her_sts_high+her_sts_vhigh)`

LONG — sum_her_sts

STATIC TEXT

E `sum_her_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — her_sts_dtq

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_her_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• Low pH-values have a direct impact on herring reproduction (Franke and Clemmesen 2011)
• pH-value reduction from 8-7, indicating decrease in protein biosynthesis (Franke and Clemmesen 2011)

Low

NUMERIC: INTEGER — her_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [73]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — her_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [74]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — her_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [75]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — her_sta_vhigh

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [76]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(her_sta_low+her_sta_mod+her_sta_high+her_sta_vhigh)`

LONG — sum_her_sta

STATIC TEXT

E `sum_her_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — her_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

POPULATION GROWTH RATE

E `sum_her_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• $F_{MSY}=0.31$; $F_{pa}=0.41$ (ICES 2021) • r=0.62 (Western Baltic Sea)
Von Bertalanffy K	• 0.28-0.41 (Western Baltic Sea)
Age at maturity (t_m)	• 3 years (Western Baltic Sea)
Maximum age (t_{max})	• 10 years (Baltic Sea)
Natural mortality (M)	• 0.36 (Southern Baltic Sea)
Maximum length (L_{inf})	• 31 cm TL

(www.fishbase.org, (Froese and Pauly 2021))

Low

NUMERIC: INTEGER — her_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [77]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — her_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [78]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — her_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [79]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — her_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [80]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_her_pgr

`(her_pgr_low+her_pgr_mod+her_pgr_high+her_pgr_vhigh)`

STATIC TEXT

E `sum_her_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER her_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_her_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Low oxygen below 50% of saturation: larval size at hatching was reduced (Braum 1973)
• Eggs can tolerate a decreased oxygen supply, but egg development was reduced and embryos were malformed (Braum 1985)
• Pollution: oil spills (Hose et al. 1996; Incardona et al. 2012; Norcross et al. 1996)
• Predation on herring eggs (Kotterba et al. 2014; Kotterba et al. 2017)
• Eutrophication related cascade effects: Low substrate complexity and algae exudates due to eutrophication (von Nordheim et al. 2018; von Nordheim et al. 2020)
• Storm impact on eggs attached to vegetation (Moll et al. 2018)

Low

NUMERIC: INTEGER her_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [81]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER her_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [82]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER her_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [83]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER her_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [84]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE
(her_ost_low+her_ost_mod+her_ost_high+her_ost_vhigh)

LONG — sum_her_ost

STATIC TEXT

E sum_her_ost != 5

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

NUMERIC: INTEGER — her_ost_dtq

ATLANTISCHER HERING - ATLANTIC HERRING (CLUPEA HARENGUS)

DIRECTION OF EFFECTS

E sum_her_pgr == 5

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

NUMERIC: INTEGER — her_doe_pos

Neutral

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

NUMERIC: INTEGER — her_doe_neu

Negative

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

NUMERIC: INTEGER — her_doe_neg

VARIABLE
(her_doe_pos+her_doe_neu+her_doe_neg)

LONG — sum_her_doe

STATIC TEXT

E sum_her_doe != 4

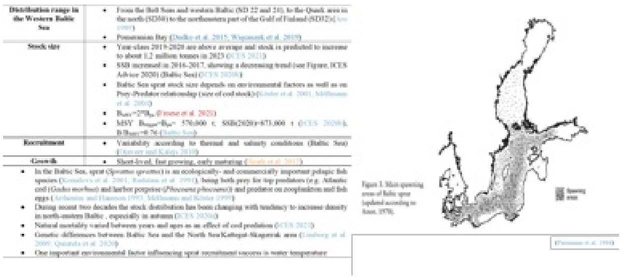
The attribute direction of change must have a sum of 4

Comments:

TEXT — her_com

STATIC TEXT

Additional Information:



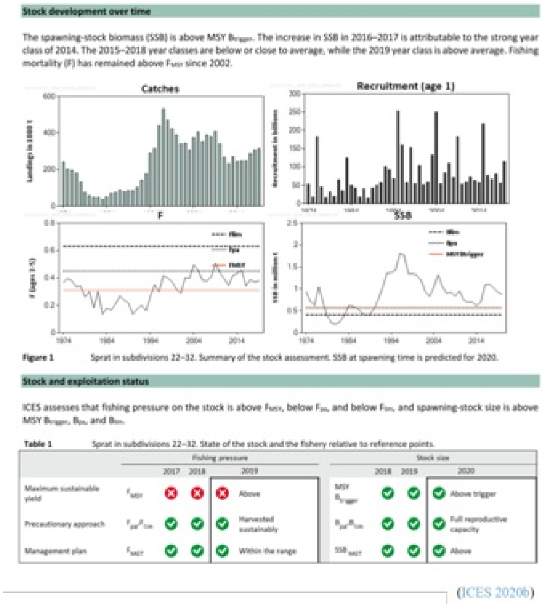
Distribution range in the Western Baltic Sea	• From the Belt Seas and western Baltic (SD 22 and 24), to the Quark area in the north (SD30) to the northeastern part of the Gulf of Finland (SD32) (Aro 1989) • Pomeranian Bay (Dudko et al. 2015; Wojciechowski et al. 2019)
Stock size	• Year-class 2019-2020 are above average and stock is predicted to increase to about 1.2 million tonnes in 2023 (ICES 2021) • SSB increased in 2016-2017, showing a decreasing trend (see Figure, ICES Advice 2020) (Baltic Sea) (ICES 2020b) • Baltic Sea sprat stock size depends on environmental factors as well as on Prey-Predator relationship (size of cod stock) (Köster et al. 2001; Möllmann et al. 2004) • B_{MSY}=2*B_{lim} (Froese et al. 2021) • MSY $B_{trigger}$=B_{pa}= 570,000 t; SSB(2020)=871,000 t (ICES 2020b); B/B_{MSY}=0.76 (Baltic Sea)
Recruitment	• Variability according to thermal and salinity conditions (Baltic Sea) (Ojaveer and Kalejs 2010)
Growth	• Short-lived, fast growing, early maturing (Haslob et al. 2013)

• In the Baltic Sea, sprat (*Sprattus sprattus*) is an ecologically- and commercially important pelagic fish species (Kornilovs et al. 2001; Rudstam et al. 1994), being both prey for top predators (e.g. Atlantic cod (*Gadus morhua*) and harbor porpoise (*Phocoena phocoena*)) and predator on zooplankton and fish eggs (Arrhenius and Hansson 1993; Möllmann and Köster 1999)
• During recent two decades the stock distribution has been changing with tendency to increase density in north-eastern Baltic, especially in autumn (ICES 2020b)
• Natural mortality varied between years and ages as an effect of cod predation (ICES 2021)
• Genetic differences between Baltic Sea and the North Sea/Kattegat-Skagerrak area (Limborg et al. 2009; Quintela et al. 2020)
• One important environmental factor influencing sprat recruitment success is water temperature

Figure 3. Main spawning areas of Baltic sprat (updated according to Aro, 1978).

(Parmanne et al. 1994)

STATIC TEXT



Stock development over time

The spawning-stock biomass (SSB) is above MSY $B_{trigger}$. The increase in SSB in 2016–2017 is attributable to the strong year class of 2014. The 2015–2018 year classes are below or close to average, while the 2019 year class is above average. Fishing mortality (F) has remained above F_{MSY} since 2002.

Figure 1 Sprat in subdivisions 22–32. Summary of the stock assessment. SSB at spawning time is predicted for 2020.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY}, below F_{pa}, and below F_{lim}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

Table 1 Sprat in subdivisions 22–32. State of the stock and the fishery relative to reference points.

	Fishing pressure					Stock size				
		2017	2018	2019			2018	2019	2020	
Maximum sustainable yield	F_{MSY}	✗	✗	✗	Above	MSY $B_{trigger}$	✓	✓	✓	Above trigger
Precautionary approach	F_{pa},F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	✓	✓	✓	Within the range	SSB_{MGT}	✓	✓	✓	Above

(ICES 2020b)

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Overwintering in central/deep parts of the Baltic Sea, adults overwinter in water temp. ≥ 4°C, below the halocline (Parmanne et al. 1994; Rechlin 1967)
• Spawning grounds are located in the central Baltic Sea within deep Basins (Haslob 2011): Bornholm Basin, Gdansk Deep and Gotland Basin (Parmanne et al. 1994)
• Baltic sprat is able to adapt its reproductive tactics to the highly variable pelagic habitat of the Baltic Sea (Döring et al. 2018)
• Mass spawning occurs in the coastal slope, above 20-30 m to 140-160 m (Ojaveer and Kalejs 2010)
• Immigration to central and deepest part of Baltic proper: forming winter shoals (Parmanne et al. 1994)

Low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
[And 124 other symbols [85]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `spr_hab_low`

Moderate

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
[And 19 other symbols [86]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `spr_hab_mod`

High

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
[And 132 other symbols [87]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `spr_hab_high`

Very high

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
[And 164 other symbols [88]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `spr_hab_vhigh`

VARIABLE

`(spr_hab_low+spr_hab_mod+spr_hab_high+spr_hab_vhigh)`

LONG — `sum_spr_hab`

STATIC TEXT

E `sum_spr_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `spr_hab_dtq`

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

PREY SPECIFICITY

E `sum_spr_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• *Juveniles: After metamorphosis (32-41 mm): feeding on cladocerans, bivalve larvae, mysids (North Sea) (De Silva 1973; ICES 2006; Russell 1976)*
• *Adults: Calanoid copepods (Temora longicornis) (Central Baltic Sea) (Möllmann et al. 2004)*
• *Prey preferences shifted between day and night: During day T. longicornis and during night Podon spp. (Central Baltic Sea) (Bernreuther et al. 2013)*

Low

NUMERIC: INTEGER

spr_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [89]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ .

Moderate

NUMERIC: INTEGER

spr_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [90]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ .

High

NUMERIC: INTEGER

spr_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [91]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ .

Very high

NUMERIC: INTEGER

spr_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [92]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ .

VARIABLE

`(spr_prey_low+spr_prey_mod+spr_prey_high+spr_prey_vhigh)`

LONG

sum_spr_prey

STATIC TEXT

E `sum_spr_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	spr_prey_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	------------------------------------	

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

ADULT MOBILITY

E `sum_spr_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Migrating from more coastal areas to offshore parts of the Baltic basins, forming feeding shoals (Aro 1989; Lindquist 1971)*
- *Diurnal vertical migration: near bottom (day), schools moving to surface at dusk (Central Baltic Sea) (Nilsson et al. 2003)*

Low	NUMERIC: INTEGER	spr_mob_low
I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [93] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
Moderate	NUMERIC: INTEGER	spr_mob_mod
I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [94] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
High	NUMERIC: INTEGER	spr_mob_high
I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [95] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
Very high	NUMERIC: INTEGER	spr_mob_vhigh
I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
VARIABLE `(spr_mob_low+spr_mob_mod+spr_mob_high+spr_mob_vhigh)`	LONG	sum_spr_mob

STATIC TEXT

E `sum_spr_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER spr_mob_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_spr_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

- *Eggs and larvae are pelagic (Petereit et al. 2008)*
- *Depending on temperature: 5 days post fertilization at 14.7°C (Petereit et al. 2008)*

Low NUMERIC: INTEGER spr_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita

And 39 other symbols [96]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER spr_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot

And 56 other symbols [97]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER spr_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne

And 47 other symbols [98]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER spr_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni

And 93 other symbols [99]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE LONG sum_spr_els

`(spr_els_low+spr_els_mod+spr_els_high+spr_els_vhigh)`

STATIC TEXT

`sum_spr_els != 5`

E *The attribute dispersal of early life stages must have a sum of 5*

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER spr_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_spr_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Larvae feed on diatoms, copepods (Temora and Acartia spp.) important (Köster et al. 2003; Möllmann et al. 2004)
• first-feeding larvae early in the spawning season prey exclusively upon microplankton, small larvae fed mainly upon nauplii of the copepods Acartia spp., Temora longicornis and Centropages hamatus (ca. 65%), whereas larger larvae consumed up to 80% Acartia spp. copepodites and adults, as well as cladocerans (Dickmann et al. 2007; Voss et al. 2003)
• Increased mortality observed at temperatures < 5°C (Nissling 2004)
• Optimal thermal windows for growth and survival change during early life stages: Eggs (5-17°C), early feeding larvae (5-12°C) (Peck et al. 2012)
• Larvae (>10 mm): change in diel migration (whereas larvae migrated to surface by night, staying in 30-50 m deep by day (~1990)), larvae showed no dial vertical migration between (1998-2002), remaining in warm, near-surface water by day and night) (Voss et al. 2007)

Low

NUMERIC: INTEGER spr_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [100]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER spr_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [101]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High	NUMERIC: INTEGER spr_ssr_high
I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [102] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________
Very high	NUMERIC: INTEGER spr_ssr_vhigh
I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [103] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________
VARIABLE `(spr_ssr_low+spr_ssr_mod+spr_ssr_high+spr_ssr_vhigh)`	LONG sum_spr_ssr

STATIC TEXT

E `sum_spr_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER spr_ssr_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	________________________________

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_spr_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Multiple batch spawners, repeated spawning throughout season (Haslob 2011; ICES 2006)
• Spawning grounds are located in the central Baltic Sea within deep Basins (Haslob 2011)
• Main spawning areas includes Baltic Proper, western and central Gulf of Finland and in some years the western Gulf of Riga (Ojaveer and Kalejs 2010)
• Spawning starts in deep water, migrating during season to warmed-up surface waters (Parmanne et al. 1994)
• Spawning at depths: 90-110 m in the Bornholm, Stolpe and Gulf of Gdansk areas in Feb.-March, March to July (Baltic Sea) (Petereit et al. 2008)
• According to lower salinity: egg buoyancy is restricted to more saline, deeper waters (water depths 40-65 m) (Petereit et al. 2008)

Low I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER — `spr_crs_low`
Moderate I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER — `spr_crs_mod`
High I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER — `spr_crs_high`
Very high I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER — `spr_crs_vhigh`
VARIABLE `(spr_crs_low+spr_crs_mod+spr_crs_high+spr_crs_vhigh)`	LONG — `sum_spr_crs`

STATIC TEXT

E `sum_spr_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER — `spr_crs_dtq`

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

POPULATION SPAWNING CYCLE

E `sum_spr_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• *Spawning season from March to late June (Baltic Sea) (Haslob 2011; Petereit et al. 2008)*

Low

NUMERIC: INTEGER spr_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [104]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER spr_spw_mod

I Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning su
And 105 other symbols [105]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER spr_spw_high

I One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [106]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER spr_spw_vhigh

I One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [107]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE
`(spr_spw_low+spr_spw_mod+spr_spw_high+spr_spw_vhigh)`

LONG sum_spr_spw

STATIC TEXT

E `sum_spr_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER spr_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_spr_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Benefits from rising temperatures, low temperatures suppress growth and gonadal development (MacKenzie and Köster 2004), key variable for recruitment and population dynamics
• Increased larval mortality observed at temperatures < 5°C (Nissling 2004)
• Optimal thermal windows for growth and survival change during early life stages: Eggs (5-17°C), early feeding larvae (5-12°C) (Peck et al. 2012)
• At high temperatures (17.4-20°C), hatching occurred prematurely before many of the eggs had reached stage IV (larvae spreading the full circumference of egg) (North Sea) (Thompson et al. 1981)
• Normal reproduction: 6-12°C (citation in Ojaveer and Kalejs 2010), 6-18.5°C, sprat is capable to develop successfully over a wide range of temperatures (North Sea) (Thompson et al. 1981)
• Threshold below 3.4 °C and above 14.7°C (Baltic Sea) (Petereit et al. 2008)
• Recruitment was highest at intermediate water temperatures experienced during spawning (5.0 and 9.0 °C) but tended to be lower at colder (<3 °C) and warmer (>11 °C) waters (Baltic Sea) (MacKenzie and Köster 2004)
• Baltic sprat model predicted reduced maximum body sizes with increasing temperature (Frisk et al. 2015)

Low

NUMERIC: INTEGER `spr_stt_low`

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures [And 326 other symbols [108]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `spr_stt_mod`

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat [And 336 other symbols [109]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `spr_stt_high`

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te [And 400 other symbols [110]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `spr_stt_vhigh`

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp [And 341 other symbols [111]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(spr_stt_low+spr_stt_mod+spr_stt_high+spr_stt_vhigh)`

LONG `sum_spr_stt`

STATIC TEXT

E `sum_spr_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER spr_stt_dtq

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_spr_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• Tolerance to a wide range of salinities, also abundant in estuarine habitats (ICES 2006), in the North Sea (30-33 psu)
• Reproduction: 5-6 psu (Baltic Sea) (Ojaveer and Kalejs 2010)

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER spr_sts_low
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne And 3 other symbols [112] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER spr_sts_mod
High I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [113] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER spr_sts_high
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if And 28 other symbols [114] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER spr_sts_vhigh
VARIABLE `(spr_sts_low+spr_sts_mod+spr_sts_high+spr_sts_vhigh)`	LONG sum_spr_sts

STATIC TEXT

E `sum_spr_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — spr_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_spr_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low — NUMERIC: INTEGER — spr_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [115]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — spr_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [116]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — spr_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [117]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high — NUMERIC: INTEGER — spr_sta_vhigh

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [118]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (spr_sta_low+spr_sta_mod+spr_sta_high+spr_sta_vhigh)	LONG	sum_spr_sta

STATIC TEXT

E `sum_spr_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	spr_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

POPULATION GROWTH RATE

E `sum_spr_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• $F_{MSY}=0.26$ (Baltic Sea) (ICES 2021) • r= 0.52 (Baltic Sea)
Von Bertalanffy K	• 0.68-1.02 (Western Baltic Sea)
Age at maturity (t_m)	• 1.2 (Baltic Sea)
Maximum age (t_{max})	• 6 (Baltic Sea, Bay of Gdansk)
Natural mortality (M)	• 0.7 (Western Baltic Sea)
Maximum length (L_{inf})	• 14.7 cm

(www.fishbase.org, (Froese and Pauly 2021))

Low	NUMERIC: INTEGER	spr_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [119]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate	NUMERIC: INTEGER	spr_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [120]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 And 88 other symbols [121] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER --------------------------------	spr_pgr_high
Very high I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 And 79 other symbols [122] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER --------------------------------	spr_pgr_vhigh
VARIABLE `(spr_pgr_low+spr_pgr_mod+spr_pgr_high+spr_pgr_vhigh)`	LONG	sum_spr_pgr

STATIC TEXT

E `sum_spr_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER --------------------------------	spr_pgr_dtq

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_spr_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Suggestion that sprat will be robust to the expected changes in pH (Havenhand 2012)
• Egg survival depends on wind conditions, high wind stress results in high mortality of eggs distributed during these months in upper water layers, wind conditions also impact feeding success in larvae (Köster et al. 2003)
• In Norwegian fjords/overwintering areas: lower tolerable oxygen content was ~0.5 ml O_2/l (~7 % O_2 saturation) (Kaartvedt et al. 2009)
• Vertical distribution threshold: 5°C and 1 ml/l (Stepputtis 2006)

Low

NUMERIC: INTEGER `spr_ost_low`

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
[And 323 other symbols [123]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `spr_ost_mod`

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
[And 321 other symbols [124]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `spr_ost_high`

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
[And 321 other symbols [125]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `spr_ost_vhigh`

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
[And 315 other symbols [126]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(spr_ost_low+spr_ost_mod+spr_ost_high+spr_ost_vhigh)`

LONG `sum_spr_ost`

STATIC TEXT

E `sum_spr_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER `spr_ost_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHE SPROTTE - EUROPEAN SPRAT (SPRATTUS SPRATTUS)

DIRECTION OF EFFECTS

E `sum_spr_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive	NUMERIC: INTEGER	spr_doe_pos
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
Neutral	NUMERIC: INTEGER	spr_doe_neu
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
Negative	NUMERIC: INTEGER	spr_doe_neg
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
VARIABLE `(spr_doe_pos+spr_doe_neu+spr_doe_neg)`	LONG	sum_spr_doe

STATIC TEXT

E `sum_spr_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT	spr_com

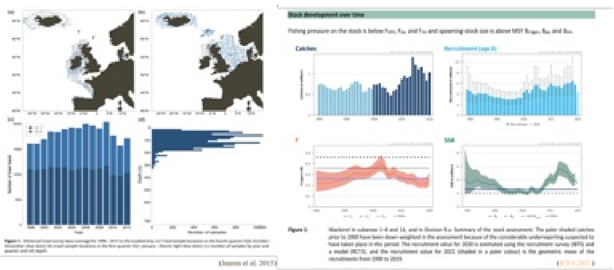
STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• North Sea, Skagerrak, Kattegat and inner Danish waters (Jansen and Gislason 2011), also caught in the Western Baltic Sea (around Kiel and Rügen) (Rummel et al. 2016)
Stock size	• SSB increased since 2007, reaching a maximum in 2014, declining trend since then (Northeast Atlantic and adjacent waters) (ICES 2020a) • Spawning-stock size is above MSY $B_{trigger}$, B_{pa} and B_{lim} (ICES 2021) • B_{MSY}=2*B_{pa} (Froese et al. 2021) • MSY $B_{trigger}$=B_{pa}= 2,580,000 t; SSB(2021)=3,510,849 t (ICES 2020c; ICES 2021), B/B_{MSY}=0.68 (Northeast Atlantic and adjacent waters)
Recruitment	• Recruitment variable, on a higher level since 2001, highest recruitment in time-series in 2018 and 2019 (see Figure 1 (ICES 2021) • Recruitment is rather stable and significant part of the variability has been explained by an index of wind induced turbulence (Borja et al. 2002)
Growth	• At an average temperature of 15- 17°C. *S. scombrus* grew at a rate of about 0.64-0.81 mm/d in St. Georges Bay, which is very similar to the average growth rate from birth to metamorphosis (0.73mm/d) estimated from calculations (Ware and Lambert 1985)

- In the North East Atlantic (NEA) mackerel spawn from the Mediterranean Sea in the south to the Faroe Islands in the North and from Hatton Bank in the West to Kattegat in the East (Jansen and Gislason 2013)
- Separation of mackerel on the eastern and western side of the Atlantic (from tagging studies) (Jansen and Gislason 2013)
- Mackerel in the eastern Atlantic: divided into three spawning components according to spawning areas: Southern (Gibraltar to southern Biscay), Western (Biscay to northwest Scotland) and North Sea, North Sea component is considered to be a distinct stock (Jansen and Gislason 2011)
- Stock is highly migratory and widely distributed throughout the Northeast Atlantic with significant fisheries in most ICES subareas; mackerel fishery takes place from Oct. through to March of the subsequent year (ICES 2020b)
- Declining trend in the weights-at-age of fish 6 years and older since the mid-2000s (ICES 2020c)

STATIC TEXT



STATIC TEXT

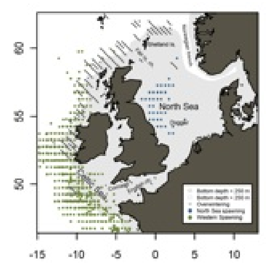


Figure 2: Mackerel populations and distribution around the North-west European shelf. Continental shelf marked in grey (bottom depth < 250 m). Spawning areas indicated by dots. Each dot marks an observation of 50+ eggs m²/day (data from international mackerel egg surveys in the North Sea 2002–2011 and western areas 1977–2007 (ICES WGMEGS)). Stripes mark the distribution of mackerel before spawning (based on commercial catch data in January-March 1985–2010). (Jansen and Gislason 2013)

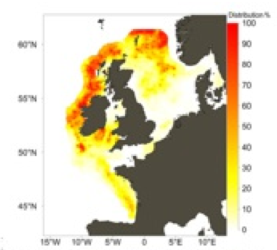


Figure 8. Distribution of juvenile mackerel during their first winter (October – March) proxied by modelled square root transformed catch rates in demersal trawl surveys.

(Jansen et al. 2015)

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Typically epipelagic species, mainly caught in shelf seas and along shelf edges in waters of 15-200 m depth (citation in ICES 2006; Jansen et al. 2015)
• Mackerel are predominantly distributed above the thermocline, often near the surface during summer feeding period (Nøttestad et al. 2015)

• *During the wintering and pre-spawning period in March, mackerel are practically not feeding, stay deep close to the bottom, have a high degree of patchiness, aggregate in large and dense shoals for protection from predators, and further reduce their swimming behaviour to save energy before spawning (citation in Nøttestad et al. 2015)*
• *Spawning: Optimal spawning habitats were modelled: Areas with sea surface temperature (10-16.5°C), salinity above 31 and depths < 120 m (Gulf of St. Lawrence, North Atlantic) (Mbaye et al. 2020)*
• *Spawning takes place in the central North Sea and to a lesser degree also in Skagerrak-Kattegat (see citations in Jansen and Gislason 2011)*
• *In the North Sea and Kattegat/Skagerrak high egg abundances are found above the thermocline (Ware and Lambert 1985; Trenkel et al. 2014)*
• *After spawning mackerel redistributes in the North Sea or migrates into nearby waters such as the Skagerrak, Kattegat, the Sound, the Belt Sea and the western Baltic Sea (Jansen and Gislason 2011)*
• *North Sea mackerel overwinters in deeper parts of Skagerrak (see citations in Jansen and Gislason 2011), it is also stated that North Sea mackerel overwinter in the Norwegian trench and of the Shetlands and Orkneys and Ireland (1980s) (Agnalt 1989; Bakken and Westgård 1986)*
• *Nursery areas: Most important nursery areas for the NEA mackerel appeared to be around Ireland, north and west of Scotland, in the northern North Sea north of 59°N, and, to some extent, also in the Bay of Biscay (see Fig. 8) (Jansen et al. 2015)*

Low I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul And 124 other symbols [127] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_hab_low` ________________________________
Moderate I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts And 19 other symbols [128] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_hab_mod` ________________________________
High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [129] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_hab_high` ________________________________
Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [130] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_hab_vhigh` ________________________________
VARIABLE `(mak_hab_low+mak_hab_mod+mak_hab_high+mak_hab_vhigh)`	LONG `sum_mak_hab`

STATIC TEXT

E `sum_mak_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER mak_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

PREY SPECIFICITY

E `sum_mak_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Juveniles (21-29 cm): Euphausiids, crustacean larvae and other zooplankton (in spring); gelatinous zooplankton (Spain, Atlantic) (Olaso et al. 2005)
• Adults (30-45 cm): Euphausiids, cannibalistic (feeding on their own eggs in spring), blue whiting (in autumn) (Spain, Atlantic) (Olaso et al. 2005)
• Feeding on hydromedusa Aglantha digitale (occurrence in temperate and boreal waters) (Runge et al. 1987)
• Main zooplankton prey species in the North Sea are: Copepods (mainly Calanus finmarchicus) (preference/feeding selectivity for older development stages (Prokopchuk and Sentyabov 2006), euphausiids (mainly Meganyctiphanes norvegica), while primary fish prey species are: sandeel, herring, sprat, and Norway pout (North Sea) (ICES 2017)

Low

NUMERIC: INTEGER mak_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
[And 164 other symbols [131]]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mak_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
[And 184 other symbols [132]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mak_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
[And 212 other symbols [133]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mak_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
[And 104 other symbols [134]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (mak_prey_low+mak_prey_mod+mak_prey_high+mak_prey_vhigh)	LONG sum_mak_prey

STATIC TEXT

E `sum_mak_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — mak_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

ADULT MOBILITY

E `sum_mak_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Highly migratory (ICES 2020b)
• Adults perform extensive migrations between overwintering (deep water along the edge of continental shelf (Shetlands, Norwegian Deeps, Skagerrak), spawning (central North Sea) and feeding grounds (Nordic Seas (Norwegian, Iceland, Greenland Seas)) (Nøttestad et al. 2015) and Northern North Sea (ICES 2006)

Low — NUMERIC: INTEGER — mak_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [135]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — mak_mob_mod

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [136]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — mak_mob_high

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [137]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mak_mob_vhigh
VARIABLE `(mak_mob_low+mak_mob_mod+mak_mob_high+mak_mob_vhigh)`	LONG sum_mak_mob

STATIC TEXT

E `sum_mak_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER mak_mob_dtq

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_mak_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Pelagic eggs and larvae (movement restricted to the vertical dimension) (Jansen et al. 2015)
• Passive drift with currents until they start vertical migration (Jansen and Gislason 2013)
• Winds and currents play an important role in the passive transport of larvae toward nursery grounds (Bartsch et al. 2004)
• Eggs, larvae and early post-larvae drift passively, but they become increasingly mobile as they increase in size (Bartsch 2005)
• At 13°C the eggs hatch in about 5.9 days (142 h) compared with 2.9 days (69 h) at 20°C (Ware and Lambert 1985)

Low I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita And 39 other symbols [138] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mak_els_low

Moderate | NUMERIC: INTEGER | mak_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [139]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | mak_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [140]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | mak_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [141]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE | LONG | sum_mak_els

`(mak_els_low+mak_els_mod+mak_els_high+mak_els_vhigh)`

STATIC TEXT

E `sum_mak_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | mak_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_mak_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Eggs are pelagic (Trenkel et al. 2014), majority is distributed from 30-70 m (depth varies with season, diameter and thermocline) (Studholme et al. 1999)*
- *Larvae prey on copepod eggs and nauplii (Calanus finmarchicus) (Ringuette et al. 2002)*
- *Diet of larvae (4.5->5 mm) composed of the nauplii of Acartia hudsonica, Temora longicornis and Pseudocalanus sp.*

and some copepodites of A. hudsonica and T. longicornis and smaller proportions of phytoplankton (Peterson and Ausubel 1984)
• Mackerel > 6.5 mm were cannibalistic, eating larvae of 3.5-4.5 mm in length (Peterson and Ausubel 1984)
• By 8 mm stage: mackerel began to eat other fish larvae (Ware and Lambert 1985)
• high abundance of the preferred prey at the onset of exogenous feeding and relatively warm temperature during the larval growth season are important prerequisites for the emergence of a strong year class in Atlantic mackerel (Robert et al. 2009)
• During early development the larvae undergo a major change in body form which probably enhances their success in capturing active prey and in avoiding predators (Ware and Lambert 1985)
• Feeding behaviour in larvae: Onset of feeding was ~ 3.8-4.5 mm (Ware and Lambert 1985)
• Metamorphosis is reached at 15 mm (Ware and Lambert 1985)

Low

NUMERIC: INTEGER — `mak_ssr_low`

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [142]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `mak_ssr_mod`

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [143]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `mak_ssr_high`

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [144]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `mak_ssr_vhigh`

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [145]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mak_ssr_low+mak_ssr_mod+mak_ssr_high+mak_ssr_vhigh)`

LONG — `sum_mak_ssr`

STATIC TEXT

E `sum_mak_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER

mak_ssr_dtq

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_mak_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Serial or batch-spawner (Studholme et al. 1999)
• Spawning migration starts in spring at a surface temperature of 7-8°C, peak spawning occurs about 26 days later, when water temperatures has warmed to 13°C (Gulf of Lawrence, North Atlantic) (Ware and Lambert 1985)
• Large fish arrived earlier at spawning grounds and left later than the small mackerel (Jansen and Gislason 2011)
• Juveniles are regularly found in Icelandic waters (Astthorsson et al. 2012): Indication of new nursery areas due to northern expansion (Brunel et al. 2018)
• Atlantic mackerel display isolated and different life-cycle patterns across the Atlantic Ocean (Jansen and Gislason 2013)

Low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER

mak_crs_low

Moderate

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER

mak_crs_mod

High

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER

mak_crs_high

Very high

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER

mak_crs_vhigh

VARIABLE

`(mak_crs_low+mak_crs_mod+mak_crs_high+mak_crs_vhigh)`

LONG

sum_mak_crs

STATIC TEXT

E `sum_mak_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER mak_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

POPULATION SPAWNING CYCLE

E `sum_mak_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• One clear seasonal peak per year (Froese and Pauly 2021)
• Main spawning period is mid-May to late June/July (North Sea/Skagerrak) (Agnalt 1989; Jansen and Gislason 2011)
• "All at once" egg release (spawning about a 2 month period, rather concentrated within a 2 week span) (Lambert and Ware 1984)

Low

NUMERIC: INTEGER mak_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur
And 49 other symbols [146]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mak_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [147]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mak_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [148]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mak_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [149]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (mak_spw_low+mak_spw_mod+mak_spw_high+mak_spw_vhigh)	LONG	sum_mak_spw

STATIC TEXT

E `sum_mak_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | mak_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_mak_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Atlantic mackerel (Scomber scombrus) is one Northeast U.S. Shelf species identified as vulnerable and exposed to climate change (Hare et al. 2016)
• Distribution expanding further north into Icelandic waters during warmer periods (Astthorsson et al. 2012)
• Northeastern Atlantic mackerel is expected to continue tracking its thermal niche, those changes in the distribution might have severe impact on the recruitment since the leading-edge areas might not fit all the needs for egg and larvae development (Bruge et al. 2016)
• Spawning migration starts in spring at a surface temperature of 7-8°C, peak spawning occurs about 26 days later, when water temperatures has warmed to 13°C (Gulf of Lawrence, North Atlantic) (Ware and Lambert 1985)
• Eggs are found over a wide temperature range: 8-18°C (Reid 2001), with thermal optimum at 10-15°C (Brunel et al. 2018; Reid 2001)
• Egg mortality low between 11-13°C, high at 8.6°C (Mendiola et al. 2006)
• Thermal thresholds: <5-6°C or >15-16°C (citation in Studholme et al. 1999)
• Temperature clearly plays a role in the modification of the pre-spawning migration (Trenkel et al. 2014)
• Sensitivity to phenological changes: Time of spawning is related to surface temperature (Jansen and Gislason 2011)
• In warm years, mackerel in the North Sea spawn earlier than in cold years (Jansen and Gislason 2011)
• Mackerel spawning distribution is expected to shift westward (32 to 117 km) and northward (0.5 to 328 km) (Bruge et al. 2016)

Low | NUMERIC: INTEGER | mak_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [150]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [151] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_stt_mod`
High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [152] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_stt_high`
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [153] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mak_stt_vhigh`
VARIABLE `(mak_stt_low+mak_stt_mod+mak_stt_high+mak_stt_vhigh)`	LONG `sum_mak_stt`

STATIC TEXT

E `sum_mak_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `mak_stt_dtq`

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_mak_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *High egg mortality to low salinity of 23 psu (Long Island Sound) (Peterson and Ausubel 1984)*
- *Eggs can be found in waters ranging from estuaries (18-25 psu) to full seawater (>30 psu); Mortality is higher at lower salinities (<25 psu) (Studholme et al. 1999)*
- *Larvae are found in estuaries (< 25 psu), largest abundances are found in higher salinities (> 30 psu); Mortality may be*

related to salinities of < 23 psu (Studholme et al. 1999)
• Juveniles found in some inshore bays and estuaries as well as offshore at salinities > 25 psu (Studholme et al. 1999)
• Adults found in open sea although occasionally in open bays with lower salinity limits of ~ 25 psu (Studholme et al. 1999)
• In some estuaries along the northwestern Atlantic, Atlantic mackerel (adults and juveniles) were found in the mixing zone (0.5-25 psu) between June-Sept. (see Table 1 in Studholme et al. 1999)

Low

NUMERIC: INTEGER mak_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mak_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne

And 3 other symbols [154]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mak_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r

And 27 other symbols [155]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mak_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if

And 28 other symbols [156]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mak_sts_low+mak_sts_mod+mak_sts_high+mak_sts_vhigh)`

LONG sum_mak_sts

STATIC TEXT

E `sum_mak_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER mak_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_mak_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

NUMERIC: INTEGER `mak_sta_low`

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect

And 118 other symbols [157]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `mak_sta_mod`

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when

And 127 other symbols [158]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `mak_sta_high`

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi

And 118 other symbols [159]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `mak_sta_vhigh`

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c

And 49 other symbols [160]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mak_sta_low+mak_sta_mod+mak_sta_high+mak_sta_vhigh)`

LONG `sum_mak_sta`

STATIC TEXT

E `sum_mak_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER
	mak_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

POPULATION GROWTH RATE

E `sum_mak_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• Prior r=0.47 • F_{MSY}=0.26; F_{pa}=0.36 (ICES 2021) • r=0.36-0.52 (North Atlantic)
Von Bertalanffy K	• 0.43 (North Sea)-0.84 (Central North Sea)
Age at maturity (t_m)	• 2-3 year (Northeast Atlantic) (citation in Trenkel et al. 2014)
Maximum age (t_{max})	• 21 years (Ireland)
Natural mortality (M)	• 0.13-0.15 (France, Southern North Sea; Northwest Atlantic)
Maximum length (L_{inf})	• 42.0 cm TL

(www.fishbase.org, (Froese and Pauly 2021))

Low

NUMERIC: INTEGER — mak_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [161]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — mak_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [162]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — mak_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [163]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — mak_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [164]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_mak_pgr

`(mak_pgr_low+mak_pgr_mod+mak_pgr_high+mak_pgr_vhigh)`

STATIC TEXT

E `sum_mak_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER mak_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_mak_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• *Mackerel > 6.5 mm: Cannibalistic (Peterson and Ausubel 1984)*
• *Ocean acidification, deoxygenation and changes in prey composition could have deleterious effects on Atlantic mackerel (Boyd et al. 2020)*

Low

NUMERIC: INTEGER mak_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [165]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mak_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [166]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mak_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [167]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mak_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [168]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE
(mak_ost_low+mak_ost_mod+mak_ost_high+mak_ost_vhigh) | LONG | sum_mak_ost

STATIC TEXT

E sum_mak_ost != 5

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | mak_ost_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

MAKRELE - ATLANTIC MACKEREL (SCOMBER SCOMBRUS)

DIRECTION OF EFFECTS

E sum_mak_pgr == 5

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive | NUMERIC: INTEGER | mak_doe_pos

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

Neutral | NUMERIC: INTEGER | mak_doe_neu

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

Negative | NUMERIC: INTEGER | mak_doe_neg

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

VARIABLE
(mak_doe_pos+mak_doe_neu+mak_doe_neg) | LONG | sum_mak_doe

STATIC TEXT

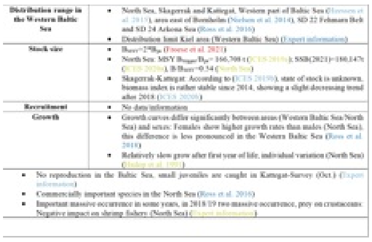
E sum_mak_doe != 4

The attribute direction of change must have a sum of 4

Comments: | TEXT | mak_com

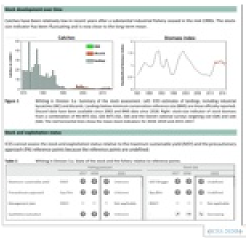
STATIC TEXT

Additional Information:

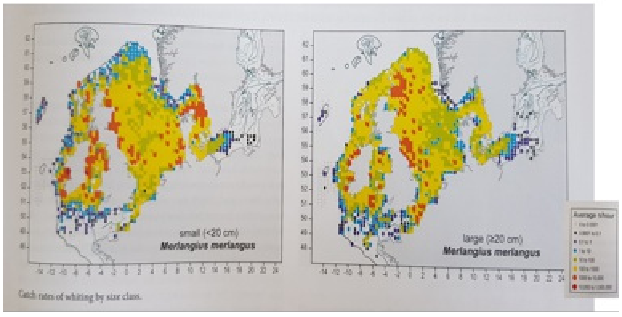


Distribution range in the Western Baltic Sea	▪ North Sea, Skagerrak and Kattegat, Western part of Baltic Sea (Heessen et al. 2015), area east of Bornholm (Nielsen et al. 2014), SD 22 Fehmarn Belt and SD 24 Arkona Sea (Ross et al. 2016) ▪ Distribution limit Kiel area (Western Baltic Sea) (Expert information)
Stock size	▪ B_{MSY}~2*B_{lim} (Froese et al. 2021) ▪ North Sea: MSY $B_{trigger}$/B_{pa}= 166,708 t (ICES 2019c); SSB(2021)=180,147t (ICES 2020e), B/B_{MSY}=0.54 (North Sea) ▪ Skagerrak-Kattegat: According to (ICES 2019f), state of stock is unknown, biomass index is rather stable since 2014, showing a slight decreasing trend after 2018 (ICES 2020f)
Recruitment	▪ No data/information
Growth	▪ Growth curves differ significantly between areas (Western Baltic Sea/North Sea) and sexes: Females show higher growth rates than males (North Sea), this difference is less pronounced in the Western Baltic Sea (Ross et al. 2016) ▪ Relatively slow grow after first year of life, individual variation (North Sea) (Hislop et al. 1991)

▪ No reproduction in the Baltic Sea, small juveniles are caught in Kattegat-Survey (Oct.) (Expert information)
▪ Commercially important species in the North Sea (Ross et al. 2016)
▪ Important massive occurrence in some years, in 2018/19 two massive occurrence, prey on crustaceans. Negative impact on shrimp fishery (North Sea) (Expert information)



STATIC TEXT



Catch rates of whiting by size class.

(Heessen et al. 2015)

WITTLING - WHITING (MERLANGIUS MERLANGUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Marine, brackish, benthopelagic (Froese and Pauly 2021)
• Mainly on mud and grave bottoms, also on sand and rock (Froese and Pauly 2021)
• Whiting showed high plasticity in spawning ground selection with extensive areas in North Sea (González-Irusta and Wright 2017)
• Pelagic juveniles often associate with jellyfish near surface (Hay et al. 1990)
• Older juveniles often abundant in coastal waters, including estuaries (Heessen et al. 2015)
• North Sea nursery area: Scottish West coast (Tobin et al. 2010)
• Spatial pattern of Sea Surface Temperature appears to affect spatial distribution in northern NS during winter and spring, not in summer (ICES 2006; Zheng et al. 2002)
• Higher densities of age-1 whiting were also associated with fine sediments and peaked at 60 m, but this influence was also dependent on proximity to shore
• Mature fish, while showing no association with any particular sediment type, were strongly associated with depths >60 m (Burns et al. 2019)
• Occurrence in water depth: Ranges from shallow inshore waters (>10 m) to 550 m, high numbers in range 30-150 m, Baltic Sea largely restricted to shallower, western waters (Heessen et al. 2015)

Low	NUMERIC: INTEGER whi_hab_low
I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul And 124 other symbols [169] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	

Moderate I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts And 19 other symbols [170] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_hab_mod ------------------------------------
High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [171] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_hab_high ------------------------------------
Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [172] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_hab_vhigh ------------------------------------
VARIABLE `(whi_hab_low+whi_hab_mod+whi_hab_high+whi_hab_vhigh)`	LONG sum_whi_hab

STATIC TEXT

E `sum_whi_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER whi_hab_dtq ------------------------------------

WITTLING - WHITING (MERLANGIUS MERLANGUS)

PREY SPECIFICITY

E `sum_whi_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• *M. merlangus are more opportunistic (Shaw et al. 2008)*
• *Adults: Clupeids (~90% of the diet in Western Baltic Sea), dominated by Clupea harengus and Sprattus sprattus almost exclusively, sometimes also crustaceans (Pihl 1994; Ross et al. 2016)*
• *Juveniles: Gobies, brown shrimps and polychaetes, piscivorous at smaller size in Western Baltic Sea (~10-20 cm) (Ross*

et al. 2016)

Low

NUMERIC: INTEGER whi_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [173]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER whi_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [174]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER whi_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [175]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER whi_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [176]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(whi_prey_low+whi_prey_mod+whi_prey_high+whi_prey_vhigh)`

LONG sum_whi_prey

STATIC TEXT

E `sum_whi_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER whi_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

WITTLING - WHITING (MERLANGIUS MERLANGUS)

ADULT MOBILITY

E `sum_whi_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Part of Skagerrak population is thought to migrate into the north-eastern North Sea to spawn (ICES 2006)
• Adult whiting have the ability to migrate large distances, tagging study showed they remained within 100 km of their release site (Tobin et al. 2010)

Low I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [177] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `whi_mob_low`
Moderate I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [178] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `whi_mob_mod`
High I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [179] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `whi_mob_high`
Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `whi_mob_vhigh`
VARIABLE `(whi_mob_low+whi_mob_mod+whi_mob_high+whi_mob_vhigh)`	LONG `sum_whi_mob`

STATIC TEXT

E `sum_whi_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `whi_mob_dtq`

DISPERSAL OF EARLY LIFE STAGES

E `sum_whi_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• *Pelagic eggs and larvae (Froese and Pauly 2021)*
• *Pelagic phase last for ~ 6 months, before settled juveniles migrate to shallow inshore waters (remain there for further 6 months Tobin et al. 2010)*
• *Duration: Hatching after 10 days, depending on temperature (Heessen et al. 2015; Russell 1976)*

Low

NUMERIC: INTEGER — `whi_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [180]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `whi_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [181]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `whi_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [182]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `whi_els_vhigh`

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [183]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(whi_els_low+whi_els_mod+whi_els_high+whi_els_vhigh)`

LONG — `sum_whi_els`

STATIC TEXT

E `sum_whi_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — whi_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

WITTLING - WHITING (MERLANGIUS MERLANGUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_whi_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Pelagic phase last for ~ 6 months, before settled juveniles migrate to shallow inshore waters (remain there for further 6 months (Tobin et al. 2010)
• Most whiting mature by age 2 and individuals spawn repeatedly (North Sea) (González-Irusta and Wright 2017; Hislop 1975)

Low — NUMERIC: INTEGER — whi_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [184]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — whi_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [185]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — whi_ssr_high

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [186]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high — NUMERIC: INTEGER — whi_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [187]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_whi_ssr

`(whi_ssr_low+whi_ssr_mod+whi_ssr_high+whi_ssr_vhigh)`

STATIC TEXT

E `sum_whi_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER whi_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

WITTLING - WHITING (MERLANGIUS MERLANGUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_whi_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Spawning in batches over a long period (Hislop 1975)
• Spawning: Jan (southern North Sea) to July in northern part (citations within ICES 2006)
• Lack of evidence for return migrations: opportunistic and non-philopatric recruitment strategy within population (Tobin et al. 2010)
• High spatial fidelity to spawning site (Loots et al. 2011)

Low

NUMERIC: INTEGER whi_crs_low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER whi_crs_mod

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER whi_crs_high

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high	NUMERIC: INTEGER	whi_crs_vhigh
I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	____________________________________.	

VARIABLE	LONG	sum_whi_crs
`(whi_crs_low+whi_crs_mod+whi_crs_high+whi_crs_vhigh)`		

STATIC TEXT

E `sum_whi_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	whi_crs_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	____________________________________.	

WITTLING - WHITING (MERLANGIUS MERLANGUS)

POPULATION SPAWNING CYCLE

E `sum_whi_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Spawning: Jan (southern North Sea) to July in northern part (citations within ICES 2006), spawning in batches over a long period (Hislop 1975)

Low	NUMERIC: INTEGER	whi_spw_low
I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur And 49 other symbols [188] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	____________________________________.	

Moderate	NUMERIC: INTEGER	whi_spw_mod
I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su And 105 other symbols [189] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	____________________________________.	

High

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [190]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — whi_spw_high

Very high

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [191]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — whi_spw_vhigh

VARIABLE
`(whi_spw_low+whi_spw_mod+whi_spw_high+whi_spw_vhigh)`

LONG — sum_whi_spw

STATIC TEXT

E `sum_whi_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — whi_spw_dtq

WITTLING - WHITING (MERLANGIUS MERLANGUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_whi_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Cold thermal preference, specialist with narrow thermal range (Dulvy et al. 2008)
• Temperature effect on swimming speed, higher at higher temperatures (Özbilgin 2002)
• Adults are found in shallow waters, at temperatures between 6-9°C (during spawning) (North Sea) (Loots et al. 2011)
• Sensitivity to phenological changes: Existing correlations with preceeding winter temperatures (North Sea) (Greve et al. 2005)

Low

NUMERIC: INTEGER — whi_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [192]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — whi_stt_mod

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [193]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — whi_stt_high

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [194]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — whi_stt_vhigh

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [195]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(whi_stt_low+whi_stt_mod+whi_stt_high+whi_stt_vhigh)`

LONG — sum_whi_stt

STATIC TEXT

E `sum_whi_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER — whi_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

WITTLING - WHITING (MERLANGIUS MERLANGUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_whi_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• *Salinity is affecting geographical distribution (Loots et al. 2011)*

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_sts_low
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [196] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_sts_mod
High I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [197] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_sts_high
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [198] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER whi_sts_vhigh
VARIABLE `(whi_sts_low+whi_sts_mod+whi_sts_high+whi_sts_vhigh)`	LONG sum_whi_sts

STATIC TEXT

E `sum_whi_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER whi_sts_dtq

WITTLING - WHITING (MERLANGIUS MERLANGUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_whi_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

NUMERIC: INTEGER — whi_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [199]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — whi_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [200]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — whi_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [201]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — whi_sta_vhigh

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [202]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(whi_sta_low+whi_sta_mod+whi_sta_high+whi_sta_vhigh)`

LONG — sum_whi_sta

STATIC TEXT

E `sum_whi_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	whi_sta_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	______________________________	

WITTLING - WHITING (MERLANGIUS MERLANGUS)

POPULATION GROWTH RATE

E `sum_whi_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• $F_{MSY}=0.17$; $F_{pa}=0.33$ (North Sea) (ICES 2019a) • r= 0.34 (North Sea)
Von Bertalanffy K	0.25 (Baltic Sea); 0.16-0.69 (Skagerrak-Kattegat)
Age at maturity (t_m)	1-2 (North Sea)
Maximum age (t_{max})	11 (Ireland, Celtic Sea)
Natural mortality (M)	0.34 (UK Scotland)
Maximum length (L_{inf})	41.3 cm TL

- (www.fishbase.org, (Froese and Pauly 2021))

Low	NUMERIC: INTEGER	whi_pgr_low
I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum And 30 other symbols [203] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

Moderate	NUMERIC: INTEGER	whi_pgr_mod
I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0. And 60 other symbols [204] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

High	NUMERIC: INTEGER	whi_pgr_high
I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 And 88 other symbols [205] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

Very high	NUMERIC: INTEGER	whi_pgr_vhigh
I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 And 79 other symbols [206] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

VARIABLE	LONG	sum_whi_pgr
`(whi_pgr_low+whi_pgr_mod+whi_pgr_high+whi_pgr_vhigh)`		

STATIC TEXT

E `sum_whi_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — whi_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

WITTLING - WHITING (MERLANGIUS MERLANGUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_whi_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• No data/information

Low — NUMERIC: INTEGER — whi_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox

And 323 other symbols [207]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — whi_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,

And 321 other symbols [208]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — whi_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,

And 321 other symbols [209]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high — NUMERIC: INTEGER — whi_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda

And 315 other symbols [210]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_whi_ost

`(whi_ost_low+whi_ost_mod+whi_ost_high+whi_ost_vhigh)`

STATIC TEXT

E `sum_whi_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER _	whi_ost_dtq

---

WITTLING - WHITING (MERLANGIUS MERLANGUS)

DIRECTION OF EFFECTS

E `sum_whi_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER _	whi_doe_pos
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER _	whi_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER _	whi_doe_neg
VARIABLE `(whi_doe_pos+whi_doe_neu+whi_doe_neg)`	LONG	sum_whi_doe

STATIC TEXT

E `sum_whi_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT	whi_com

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Occurrence from Skagerrak up to the Sea of Åland (Northern Baltic Sea) (ICES 2021a) • In the Baltic Sea, mainly distributed in Baltic proper (SD 24-29), may occur up to the Bothnian Sea (Nissling et al. 2013 and ref. therein)
Stock size	• No ICES advice requested and given (complete Baltic Sea) (ICES 2021d) • Landings and trends in the survey were used to estimate stock status for the advice, MSY $B_{trigger}$ is unknown, length-based indicator are stating an unsustainable stock status (ICES 2021a) • Stock size indicator is stable over time, but considered uncertain due to low catch rate in surveys (complete Baltic Sea) (ICES 2021d) • Skagerrak & Kattegat: MSY $B_{trigger\ proxy}$ = B/B_{MSY} = 0.5 (ICES 2021b) • B_{MSY} = 2 x MSY $B_{trigger}$ (Froese et al. 2021) • North Sea: MSY $B_{trigger}$ = 6.353 t; B_{pa}= 4.163 t; SSB(2022) = 9.336 t (ICES 2021c) • B/B_{MSY}=0.73 (North Sea)
Recruitment	• Signal of above-average recruitment apparent in most recent survey index (complete Baltic Sea) (ICES 2021a)
Growth	• In the North Sea: Turbot showed sexually dimorphic growth with females reaching a larger maximum body size than males (turbot ♂ L∞ = 44.5 cm, K = 0.44, t 0 = −0.14 year, ♀ L∞ = 66.7 cm, K = 0.32, t 0 = 0.29 year), the highest somatic growth takes place in the 2nd half of the year (van der Hammen et al. 2013)

- Mainly targeted by coastal fisheries and fishery is concentrated in the western and southern central Baltic Sea (SD22-26) (ICES 2021a)
- Turbot from SD22-SD32 (complete Baltic Sea, covering western, central and northern Baltic Sea) considered as one stock (ICES 2021a)
- Genetic data show no population structure within the Baltic Sea (Florin and Höglund 2007)
- Genetic differences between Baltic Sea turbot and North Sea turbot with the Kattegat being a transition zone (Nielsen et al. 2004)

STATIC TEXT

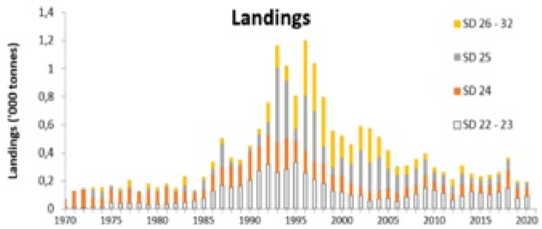


Figure 8.1. Turbot in the Baltic Sea. Development of turbot landings [t] from 1970 onwards by ICES subdivision (SD).

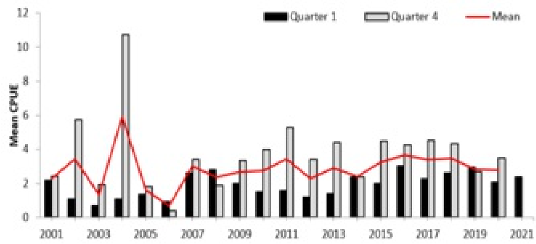


Figure 8.2. Turbot in the Baltic Sea. Mean CPUE (no. hr-1) of turbot with L ≥20 cm based on arithmetic mean of the Baltic International Trawl Survey (BITS-Q1+Q4) in subdivisions (SD) 22–28.

(ICES 2021a)

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Sandy, muddy-sandy, gravel bottoms at depth of 1-15 m (central Baltic Sea) (Aarnio et al. 1996)
• Seldom caught at depths more than 70 m (Florin and Höglund 2007 and ref. therein)
• High spawning site fidelity (central Baltic Sea) (Florin and Franzén 2010)
• Coastal species, spawns in shallow waters (10-40 m, 10-15 m in central Baltic) (ICES 2021a), feeds in deeper waters (Florin and Franzén 2010)

• *Age-0: preference for 0.2 and 0.6 m over 1 m depth, overlap with flounder age-0 (central Baltic Sea) (Martinsson and Nissling 2011)*
• *Juveniles prefer sandy substrate with low cover of filamentous algae (central Baltic Sea) (Florin et al. 2009)*
• *Age-1: remain close to the shore during the first 2 years (Skagerrak-Kattegat) (Støttrup et al. 2002)*

Low

NUMERIC: INTEGER — tur_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [211]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — tur_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [212]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — tur_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [213]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — tur_hab_vhigh

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [214]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(tur_hab_low+tur_hab_mod+tur_hab_high+tur_hab_vhigh)`

LONG — sum_tur_hab

STATIC TEXT

E `sum_tur_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — tur_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

PREY SPECIFICITY

E `sum_tur_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• < 20 cm: mainly mysids, crangon, fish (sand goby), > 20 cm: mysids, crangon, increased share of fish (sand goby, sandeel, miscellaneous roundfish and flatfish) (Kattegat) (Sparrevohn and Støttrup 2008)
• Juveniles < 30 mm: amphipods, ≥ 30 mm: mysids, amphipods and fish (gobies, sand eels, nine-spined sticklebacks) (central Baltic Sea) (Aarnio et al. 1996)
• Juveniles < 30 mm: calanoid copepods, mysdis, chironomids, amphipods; juveniles ≥ 30 mm: mysids, fish (central Baltic Sea) (Nissling et al. 2007)

Low I Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, And 164 other symbols [215] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_prey_low` ________________________________
Moderate I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of And 184 other symbols [216] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_prey_mod` ________________________________
High I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type i And 212 other symbols [217] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_prey_high` ________________________________
Very high I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles And 104 other symbols [218] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_prey_vhigh` ________________________________
VARIABLE `(tur_prey_low+tur_prey_mod+tur_prey_high+tur_prey_vhigh)`	LONG `sum_tur_prey`

STATIC TEXT

E `sum_tur_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: | NUMERIC: INTEGER | tur_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

ADULT MOBILITY

E `sum_tur_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• In a tagging study most individuals were recaptured less than 30 km from tagging site over a period of about three years (central Baltic Sea) (Florin and Franzén 2010)
• Rather sedentary (Florin and Höglund 2007; ICES 2013)

Low | NUMERIC: INTEGER | tur_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [219]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | tur_mob_mod

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [220]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | tur_mob_high

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [221]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | tur_mob_vhigh

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE | LONG | sum_tur_mob

`(tur_mob_low+tur_mob_mod+tur_mob_high+tur_mob_vhigh)`

STATIC TEXT

E sum_tur_mob != 5

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: NUMERIC: INTEGER tur_mob_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

DISPERSAL OF EARLY LIFE STAGES

E sum_tur_mob == 5

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Demersal eggs (central Baltic Sea) (not buoyant at salinities below 20 psu) (Aarnio et al. 1996; Nissling et al. 2006)
• Eggs are pelagic in marine environment (Nissling et al. 2013)
• Days until hatch: 9°C – 12 days, 12°C – 8 days, 15°C – 6 days, 18°C – 4 days, 21°C – 3 to 4 days (central Baltic Sea) (Nissling et al. 2006)
• Larvae are pelagic at the start (central Baltic Sea) (Aarnio et al. 1996 and ref. therein)
• Transportation of larvae to suitable nursery areas might be less critical; rather prevailing salinity conditions and upwelling situation may influence number of settlers (central Baltic Sea) (Nissling et al. 2006)

Low NUMERIC: INTEGER tur_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [222]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER tur_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [223]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High NUMERIC: INTEGER tur_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [224]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni And 93 other symbols [225] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER tur_els_vhigh ________________________________
VARIABLE `(tur_els_low+tur_els_mod+tur_els_high+tur_els_vhigh)`	LONG sum_tur_els

STATIC TEXT

E `sum_tur_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER tur_els_dtq ________________________________

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_tur_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Year-class strength of turbot in Baltic Sea more variable, presumably due to varying abiotic conditions (Nissling et al. 2013 and ref. therein)
• Larvae (yolk-sac) optimal growth efficiency: at 15°C (Jones 1972)
• Metamorphosed postlarvae migrate close to shore to shallow water (down to one meter depth) (Florin and Franzén 2010; ICES 2021a)
• Age-0: preference for 0.2 and 0.6 m over 1 m depth (central Baltic Sea) (Martinsson and Nissling 2011)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [226] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER tur_ssr_low ________________________________

Moderate

NUMERIC: INTEGER — tur_ssr_mod

I Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is r
[And 365 other symbols [227]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

High

NUMERIC: INTEGER — tur_ssr_high

I Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependenc
[And 310 other symbols [228]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

Very high

NUMERIC: INTEGER — tur_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific bi
[And 236 other symbols [229]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

VARIABLE

`(tur_ssr_low+tur_ssr_mod+tur_ssr_high+tur_ssr_vhigh)`

LONG — sum_tur_ssr

STATIC TEXT

E `sum_tur_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — tur_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

____

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_tur_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Complex live cycle with individuals of each life history stage having different habitat requirements and inhabit spatially distinct habitats (van der Hammen et al. 2013)
• Spawning site fidelity (central Baltic) (Florin and Franzén 2010; ICES 2021a)
• Batch-spawning at shallow depths along the coast and offshore banks (western and central Baltic Sea) (Nissling et al. 2013)
• Spawning seems to be triggered by specific temperature (13-15°C) in combination with certain daylength (15-16 h) (experimental animals presumably not from Baltic Sea, Skagerrak, Kattegat or North Sea) (Devauchelle et al. 1988)
• Decreased reproductive success at salinities < 7 psu (central Baltic Sea) (Nissling et al. 2006)

Low

NUMERIC: INTEGER — `tur_crs_low`

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `tur_crs_mod`

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `tur_crs_high`

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `tur_crs_vhigh`

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(tur_crs_low+tur_crs_mod+tur_crs_high+tur_crs_vhigh)`

LONG — `sum_tur_crs`

STATIC TEXT

E `sum_tur_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — `tur_crs_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

POPULATION SPAWNING CYCLE

E `sum_tur_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Spawn from May-July (western and central Baltic Sea) (Nissling et al. 2013)

Low I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur And 49 other symbols [230] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`tur_spw_low`
Moderate I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su And 105 other symbols [231] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`tur_spw_mod`
High I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin And 204 other symbols [232] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`tur_spw_high`
Very high I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli And 134 other symbols [233] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`tur_spw_vhigh`
VARIABLE `(tur_spw_low+tur_spw_mod+tur_spw_high+tur_spw_vhigh)`	LONG	`sum_tur_spw`

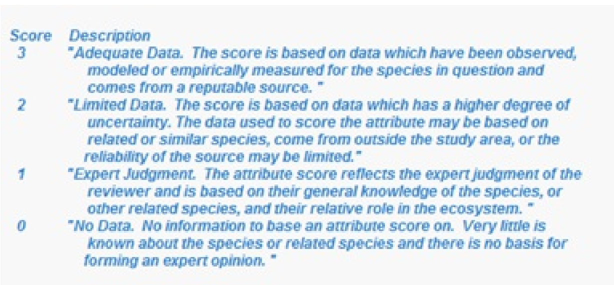
STATIC TEXT

E `sum_tur_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER	`tur_spw_dtq`

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_tur_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Larvae (yolk-sac) optimal growth efficiency: at 15°C (Jones 1972)*
- *Spawning seems to be triggered by specific temperature (13-15°C) in combination with certain daylength (15-16 h) (experimental animals presumably not from Baltic Sea, Skagerrak, Kattegat or North Sea) (Devauchelle et al. 1988)*
- *12-18°C: optimum condition for egg development and hatching; considerably lower viable hatch at 9°C and 21°C (central Baltic Sea) (Nissling et al. 2006)*
- *Relatively eurythermal with a geographic range from Norway to the Mediterranean (Gibson and Johnston 1995)*
- *Productivity is highest in areas where the maximum temperature is close to the optimal temperature for growth (16-18 °C) (van der Hammen et al. 2013)*

Low

NUMERIC: INTEGER `tur_stt_low`

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [234]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `tur_stt_mod`

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [235]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `tur_stt_high`

I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [236]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `tur_stt_vhigh`

I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [237]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(tur_stt_low+tur_stt_mod+tur_stt_high+tur_stt_vhigh)`

LONG `sum_tur_stt`

STATIC TEXT

E `sum_tur_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER tur_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

SENSITIVITY TO DECREASING SALINITY

E `sum_tur_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• Adapted to low salinity and spawn successfully up to the northern Baltic Sea (Florin 2005)
• Range of salinity for spawning from 15-10 psu in the Belt Sea (western Baltic Sea) (Nissling et al. 2006 and ref. therein) down to 7 psu (central Baltic Sea) (Nissling et al. 2006)
• Threshold for viable hatch: < 7 psu; lethal for eggs/no viable hatch at 5 psu (central Baltic Sea) (Nissling et al. 2006)
• Landings drop to zero where salinity falls below ~5 psu (central Baltic Sea) (van der Hammen et al. 2013)
• At low salinities higher rate of deformities is observed (experimental animals presumably not from Baltic Sea, Skagerrak, Kattegat or North Sea) (Devauchelle et al. 1988)

Low

NUMERIC: INTEGER tur_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER tur_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne
And 3 other symbols [238]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER tur_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [239]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER tur_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if
And 28 other symbols [240]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(tur_sts_low+tur_sts_mod+tur_sts_high+tur_sts_vhigh)`

LONG

`sum_tur_sts`

STATIC TEXT

E `sum_tur_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

`tur_sts_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_tur_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• *Juvenile turbot reared at increased CO_2-levels (pH 6.6, 6.4) lead to reduced condition, feeding, weight gain and growth rates compared to low treatment (pH 7.3), growth rates were reduced between 21-58 % (Stiller et al. 2015)*

Low

NUMERIC: INTEGER

`tur_sta_low`

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect

And 118 other symbols [241]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

`tur_sta_mod`

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when

And 127 other symbols [242]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

`tur_sta_high`

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi

And 118 other symbols [243]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c [And 49 other symbols [244]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_sta_vhigh` ________________________________
VARIABLE `(tur_sta_low+tur_sta_mod+tur_sta_high+tur_sta_vhigh)`	LONG `sum_tur_sta`

STATIC TEXT

E `sum_tur_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `tur_sta_dtq` ________________________________

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

POPULATION GROWTH RATE

E `sum_tur_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• F_{MSY}= 0.36 (ICES 2021c) • r=0.72 (North Sea)
Von Bertalanffy K	• K♂= 0.30, K♀=0.19 (Central Baltic Sea) (Stankus 2003)
Age at maturity (t_m)	• ♀= 3 years (Central Baltic Sea) (Nissling et al. 2013)
Maximum age (t_{max})	• 35 (North Sea) (van der Hammen et al. 2013)
Natural mortality (M)	• 0.1-0.25 (Central Baltic Sea) (Draganik et al. 2005)
Maximum length (L_{inf})	• ♀=54.7 cm (western and central Baltic Sea) (ICES 2021a)

Low I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum [And 30 other symbols [245]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_pgr_low` ________________________________

Moderate I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0. And 60 other symbols [246] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_pgr_mod`
High I Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 And 88 other symbols [247] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_pgr_high`
Very high I Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 And 79 other symbols [248] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `tur_pgr_vhigh`
VARIABLE `(tur_pgr_low+tur_pgr_mod+tur_pgr_high+tur_pgr_vhigh)`	LONG `sum_tur_pgr`

STATIC TEXT

E `sum_tur_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	*"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."*
2	*"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."*
1	*"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."*
0	*"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."*

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `tur_pgr_dtq`

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

SENSITIVITY TO OTHER STRESSORS

E `sum_tur_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

- *Juvenile turbot: pH 6.8-7.8 recommended for rearing turbot; at pH 7.8-8.8 significantly reduced survival rate compared to lower pH (6.3-7.3) (Shuangyao et al. 2018)*
- *High tolerance for O_2 deficient waters (Maxime et al. 2000)*

Low

NUMERIC: INTEGER

tur_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox

[And 323 other symbols [249]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

tur_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,

[And 321 other symbols [250]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

tur_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,

[And 321 other symbols [251]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER

tur_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda

[And 315 other symbols [252]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(tur_ost_low+tur_ost_mod+tur_ost_high+tur_ost_vhigh)`

LONG

sum_tur_ost

STATIC TEXT

E `sum_tur_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER

tur_ost_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

STEINBUTT - TURBOT (SCOPHTHALMUS MAXIMUS/PSETTA MAXIMA)

DIRECTION OF EFFECTS

E `sum_tur_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER tur_doe_pos ________________
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER tur_doe_neu ________________
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER tur_doe_neg ________________
VARIABLE `(tur_doe_pos+tur_doe_neu+tur_doe_neg)`	LONG sum_tur_doe

STATIC TEXT

E `sum_tur_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT tur_com ....

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Brill is distributed mainly in the western part of the Baltic Sea (Pomeranian Bay) (Więcaszek et al. 2019), the eastern border of its occurrence is not clearly described (ICES 2020a) • Cape Arkona, around Bornholm (Heessen et al. 2015) • No definition of eastern limit of its range, Gulf of Dansk (rare), single specimen mid-Polish coast and Latvian waters (citations in Więcaszek et al. 2019) • Some catches of juveniles in the Baltic Sea, not comparable with turbot (Expert information) • According to survey estimation at the edge of its distributional area in SD22-32, center of gravity in Kattegat (ICES 2021) • Located in Kattegat, catch area: Oderbank (Expert information)
Stock size	• Unclear whether it is one stock in Baltic Sea or if *S. rhombus* is a part of a larger stock complex (Więcaszek et al. 2019) • Baltic Sea: Stock size indicator: high in 2011, declined in 2012, increasing since 2016 (ICES 2020b), no reference points defined: B_{MSY}/B_{pa}/MSY $B_{trigger}$ (ICES 2017; ICES 2020b) • MSY $B_{trigger\ proxy}$=B/B_{MSY}= 0.5 (North Sea) (ICES 2019)
Recruitment	• No data/information
Growth	• Fast growing (Kerby et al. 2013) • Turbot and brill from the North Sea showed sexually dimorphic growth with females reaching a larger maximum body size than males (brill ♂ L∞ = 43.3 cm, K =0.48, t 0 = −0.27 year, ♀ L∞ = 58.0 cm, K = 0.38, t 0 = −0.27 year) • The highest somatic growth takes place in the 2nd half of the year (van der Hammen et al. 2013)

- Brill fishery is dominated by Denmark in SD 22 (95% of the catches in 1985–2016) (ICES 2020a)
- Yearly landings within the Baltic Sea have varied between 27 and 105 t. during the last ten years (ICES 2020a)
- Data limited species, stock is not regulated by TAC (ICES 2017; Kerby et al. 2013)
- Mainly bycatch species in fisheries for plaice and sole (ICES 2019)

STATIC TEXT

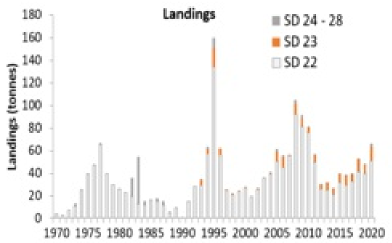


Figure 8.9. Development of brill landings (t) from 1970 onwards by ICES subdivision (SD).

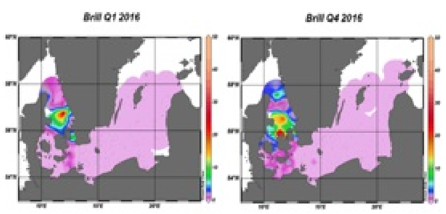
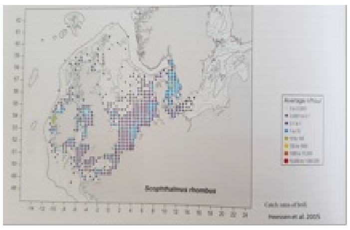
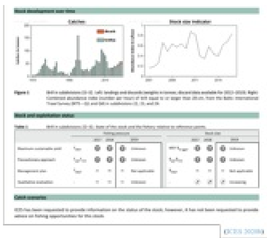


Figure 8.11. Brill distribution in the Baltic Sea, CPUE in numbers per hour indicated in colour bars.

(ICES 2021)

STATIC TEXT





GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• *Demersal, living on sandy and muddy bottoms in shallow water (Turan et al. 2016)*
• *Close to inshore areas on sandy bottoms, sometimes also on gravel (Kerby et al. 2013)*
• *Juveniles reside on sandy beach nursery grounds (Haynes et al. 2011)*

Low I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul And 124 other symbols [253] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`bri_hab_low`
Moderate I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts And 19 other symbols [254] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`bri_hab_mod`
High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [255] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`bri_hab_high`
Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [256] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	`bri_hab_vhigh`
VARIABLE `(bri_hab_low+bri_hab_mod+bri_hab_high+bri_hab_vhigh)`	LONG	`sum_bri_hab`

STATIC TEXT

E `sum_bri_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER	`bri_hab_dtq`

PREY SPECIFICITY

E `sum_bri_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Rather narrow prey-spectrum
• Juveniles feed on mysids, shrimps and juvenile gobies (Beyst et al. 1999; Haynes et al. 2011)
• Adults are piscivorous (Piet et al. 1998), prey on Neogobius melanostomus (new food item) (Więcaszek et al. 2019) and sandeels, cephalopods, to a lesser extent crustaceans and bivalves (Froese and Pauly 2021, Turan et al. 2016)
• Feed mainly on fish (stable isotope signal) (Expert information)

Low I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, And 164 other symbols [257] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `bri_prey_low` ________________________________
Moderate I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of And 184 other symbols [258] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `bri_prey_mod` ________________________________
High I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i And 212 other symbols [259] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `bri_prey_high` ________________________________
Very high I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles And 104 other symbols [260] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `bri_prey_vhigh` ________________________________
VARIABLE `(bri_prey_low+bri_prey_mod+bri_prey_high+bri_prey_vhigh)`	LONG `sum_bri_prey`

STATIC TEXT

E `sum_bri_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER bri_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

ADULT MOBILITY

E `sum_bri_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• *Short migrations to deeper waters during autumn/winter, spawning site fidelity is assumed (Florin 2005)*

Low

NUMERIC: INTEGER bri_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [261]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER bri_mob_mod

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [262]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER bri_mob_high

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [263]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER bri_mob_vhigh

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(bri_mob_low+bri_mob_mod+bri_mob_high+bri_mob_vhigh)`

LONG sum_bri_mob

STATIC TEXT

E `sum_bri_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

`bri_mob_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_bri_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Kattegat: Eggs and larvae are transported to nurseries by Baltic surface currents and wind-induced on-shore currents (Pihl 1989)
• Larvae are transported by wind-driven currents to the surface zone of sandy beach nurseries (van der Hammen et al. 2013; Van der Land 1991)

Low

NUMERIC: INTEGER

`bri_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [264]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

`bri_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [265]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

`bri_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [266]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni

And 93 other symbols [267]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER bri_els_vhigh

VARIABLE

`(bri_els_low+bri_els_mod+bri_els_high+bri_els_vhigh)`

LONG sum_bri_els

STATIC TEXT

E `sum_bri_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER bri_els_dtq

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_bri_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Egg viability decreased at ~16°C, hatching success low, when incubation temperature >16°C (Hachero-Cruzado et al. 2007)
• Some catches of juveniles in the Baltic Sea, not comparable with turbot (Expert information)

Low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s

And 245 other symbols [268]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER bri_ssr_low

Moderate

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r

And 365 other symbols [269]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER bri_ssr_mod

High	NUMERIC: INTEGER	bri_ssr_high
I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [270] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-----------------------------------	

Very high	NUMERIC: INTEGER	bri_ssr_vhigh
I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [271] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-----------------------------------	

VARIABLE	LONG	sum_bri_ssr
(bri_ssr_low+bri_ssr_mod+bri_ssr_high+bri_ssr_vhigh)		

STATIC TEXT

E `sum_bri_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	bri_ssr_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	-----------------------------------	

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_bri_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

- *In Atlantic: Spawning is sequential, every 2-4 days (Turan et al. 2016)*
- *Pelagic eggs are spawned offshore (van der Hammen et al. 2013)*
- *Turbot and brill have complex life cycles, individuals of each life history stage have different habitat requirements and inhabit spatially distinct habitats*
- *Populations can only survive in areas where these habitat requirements are fulfilled (van der Hammen et al. 2013)*

Low

NUMERIC: INTEGER — bri_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — bri_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — bri_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — bri_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(bri_crs_low+bri_crs_mod+bri_crs_high+bri_crs_vhigh)`

LONG — sum_bri_crs

STATIC TEXT

E `sum_bri_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — bri_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

POPULATION SPAWNING CYCLE

E `sum_bri_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• *North Sea: May-August (Jones 1972)*
• *Protected spawning period (turbot and brill) assumed summer spawning in June-July (Baltic Sea) (Florin 2005)*

Low

NUMERIC: INTEGER bri_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [272]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER bri_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [273]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER bri_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [274]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER bri_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [275]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(bri_spw_low+bri_spw_mod+bri_spw_high+bri_spw_vhigh)`

LONG sum_bri_spw

STATIC TEXT

E `sum_bri_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER bri_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_bri_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Egg viability decreased at ~16°C, hatching success low, when incubation temperature >16°C (Atlantic, Spain) (Hachero-Cruzado et al. 2007)
• Productivity is highest in areas where the maximum temperature is close to the optimal temperature for growth (16–18 °C) (North Sea) (van der Hammen et al. 2013)

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [276] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER bri_stt_low ______________________________
Moderate I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [277] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER bri_stt_mod ______________________________
High I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [278] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER bri_stt_high ______________________________
Very high I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [279] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER bri_stt_vhigh ______________________________
VARIABLE `(bri_stt_low+bri_stt_mod+bri_stt_high+bri_stt_vhigh)`	LONG sum_bri_stt

STATIC TEXT

E `sum_bri_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	bri_stt_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	-------------------------------	

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_bri_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Landings decrease where salinity falls below ~15 psu (brill) (North Sea) (van der Hammen et al. 2013)*
- *Limited to salinity (Expert information)*

Low	NUMERIC: INTEGER	bri_sts_low
I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-------------------------------	
Moderate	NUMERIC: INTEGER	bri_sts_mod
I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [280] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-------------------------------	
High	NUMERIC: INTEGER	bri_sts_high
I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [281] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-------------------------------	
Very high	NUMERIC: INTEGER	bri_sts_vhigh
I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [282] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	-------------------------------	
VARIABLE `(bri_sts_low+bri_sts_mod+bri_sts_high+bri_sts_vhigh)`	LONG	sum_bri_sts

STATIC TEXT

E `sum_bri_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | bri_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_bri_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• *No data/information*

Low | NUMERIC: INTEGER | bri_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect

And 118 other symbols [283]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | bri_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when

And 127 other symbols [284]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | bri_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi

And 118 other symbols [285]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | bri_sta_vhigh

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c

And 49 other symbols [286]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE | LONG | sum_bri_sta

`(bri_sta_low+bri_sta_mod+bri_sta_high+bri_sta_vhigh)`

STATIC TEXT

E `sum_bri_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	*"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "*
2	*"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."*
1	*"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "*
0	*"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "*

Data Quality Score: | NUMERIC: INTEGER | bri_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

POPULATION GROWTH RATE

E `sum_bri_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- Slower in the northern parts, maturation is attained at shorter lengths (no precise data, Więcaszek et al. 2019)

Maximum growth rate (r_{max})	• No reference points (Baltic Sea) • 0.47 (Froese and Pauly 2021)
Von Bertalanffy K	• 0.32-0.59 (Southern North Sea)
Age at maturity (t_m)	• 3 (North Sea, Western Scheldt)
Maximum age (t_{max})	• 5 (Atlantic, France)
Natural mortality (M)	• No data
Maximum length (L_{inf})	• 40.2 cm TL

(www.fishbase.org, (Froese and Pauly 2021))

Low | NUMERIC: INTEGER | bri_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum

And 30 other symbols [287]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | bri_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.

And 60 other symbols [288]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High | NUMERIC: INTEGER | bri_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25

And 88 other symbols [289]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER bri_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a
ny environmental changes Maximum growth rate (rmax) < 0.05 von Be
rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [290]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _

VARIABLE

`(bri_pgr_low+bri_pgr_mod+bri_pgr_high+bri_pgr_vhigh)`

LONG sum_bri_pgr

STATIC TEXT

E `sum_bri_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER bri_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

_ _

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_bri_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• No data/information

Low

NUMERIC: INTEGER bri_ost_low

I Population is experiencing no known/limited stress (other than fishing
pressure). Population is experiencing no or no more than one known st
ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [291]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _

Moderate

NUMERIC: INTEGER bri_ost_mod

I Population is experiencing limited/moderate stress (other than fishing
pressure). Population is experiencing no more than two known stresso
rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [292]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _

High

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [293]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — bri_ost_high

Very high

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [294]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — bri_ost_vhigh

VARIABLE
`(bri_ost_low+bri_ost_mod+bri_ost_high+bri_ost_vhigh)`

LONG — sum_bri_ost

STATIC TEXT

E `sum_bri_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — bri_ost_dtq

GLATTBUTT - BRILL (SCOPHTHALMUS RHOMBUS)

DIRECTION OF EFFECTS

E `sum_bri_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER — bri_doe_pos

Neutral

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER — bri_doe_neu

Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER bri_doe_neg
VARIABLE `(bri_doe_pos+bri_doe_neu+bri_doe_neg)`	LONG sum_bri_doe

STATIC TEXT

E `sum_bri_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT bri_com

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

dab

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Skagerrak and Kattegat, southern part Baltic Sea, Gotland (Florin 2005; Temming 1989); SD 24+25 (Nissling et al. 2002)
Stock size	• Baltic Sea: Stock size indicator increased since the early 2000s and remained stable since 2010 with some variability (ICES 2017; ICES 2020) • SD 22-32 (Baltic Sea): No reference point for defined (ICES 2017; ICES 2020) • B_{MSY}=2*B_{pa} (Froese et al. 2021) • North Sea, Skagerrak and Kattegat: MSY $B_{trigger\ proxy}$= B/B_{MSY}= 0.5 (relative value) (ICES 2019)
Recruitment	• No data/information
Growth	• Differences in growth between populations: dab in Icelandic waters grow slower than Baltic (Henderson 1998), Comparison Irish Sea and Central North Sea (citations in Henderson 1998): Females: west coast: W∞=398 g, K= 0.31, east coast W∞=328.5 g, K= 0.21; males: west coast W∞=110 g, K=0.06, east coast W∞=95.9 g, K= 0.44

- Three dab populations: Belt Sea (SD 22 and 24), Sound (SD 23) and Arkona and Bornholm basins (SD24 and 25) (ICES 2018)
- Morphological differences between Bornholm dab and western dab (Temming 1989)
- Two stocks are discussed, comparison of dab eggs from Kiel Bay and North Sea showed a reduced chorion in Kiel Bay eggs, indicating genetic adaption to float in low salinities (Lonning and Solemdal 1972; Temming 1989)

STATIC TEXT

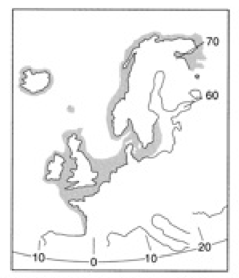
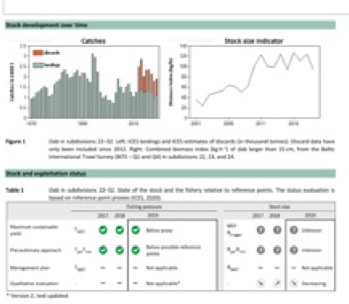


Fig. 1. The known geographical distribution of the dab *Limanda limanda*. (Henderson 1998)



(ICES 2020)

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Spawning: offshore (North Sea), eggs and larvae in coastal areas (Henderson 1998), settlement in coastal areas (Bolle et al. 1994)
• Occurrence water depth: Juveniles: 5-11m (Pihl 1989), 20-40 m, areas of highest abundance within 50 m (North Sea) (Bohl 1957, in Henderson 1998)

Low

NUMERIC: INTEGER dab_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [295]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER dab_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [296]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi [And 132 other symbols [297]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER dab_hab_high
Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater [And 164 other symbols [298]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER dab_hab_vhigh
VARIABLE `(dab_hab_low+dab_hab_mod+dab_hab_high+dab_hab_vhigh)`	LONG sum_dab_hab

STATIC TEXT

E `sum_dab_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER dab_hab_dtq

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

PREY SPECIFICITY

E `sum_dab_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Juveniles: Broader prey spectrum opportunistic: Benthic prey (polychaetes), cyprid larvae, hydrozoans, postlarval shrimps, amphipods (Amara et al. 2001; Beyst et al. 1999; Malzahn and Boersma 2009)
• Adults: Crustaceans, polychaetes most important, also fish eggs and fish and mollusks, bryozoans and hydroids (Braber and de Groot 1973)
• highly opportunistic (Hinz et al. 2005)

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [299]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER dab_prey_low

Moderate

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [300]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER dab_prey_mod

High

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [301]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER dab_prey_high

Very high

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [302]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER dab_prey_vhigh

VARIABLE
`(dab_prey_low+dab_prey_mod+dab_prey_high+dab_prey_vhigh)`

LONG sum_dab_prey

STATIC TEXT

E `sum_dab_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER dab_prey_dtq

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

ADULT MOBILITY

E `sum_dab_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• *Adults spawn offshore, in autumn juveniles migrate inshore to shallow waters, January migration to deeper waters after arrival of colder weather (Henderson 1998), dab is found in coastal waters until age 2+, then moving offshore to join adults*

Low

NUMERIC: INTEGER — `dab_mob_low`

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [303]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `dab_mob_mod`

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [304]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `dab_mob_high`

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [305]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `dab_mob_vhigh`

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_mob_low+dab_mob_mod+dab_mob_high+dab_mob_vhigh)`

LONG — `sum_dab_mob`

STATIC TEXT

E `sum_dab_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — `dab_mob_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DISPERSAL OF EARLY LIFE STAGES

E `sum_dab_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Pelagic eggs: Egg duration: 33 days at 2°C to 4.5 days at 14°C (North Sea) (Henderson 1998)
• D (days)=22 exp(-0.12T (temp.)) (North Sea) (stated in Henderson 1998)
• Kattegat: Eggs and larvae are transported to nurseries by Baltic surface current and wind-induced on-shore currents (Pihl 1989)

Low

NUMERIC: INTEGER — `dab_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [306]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `dab_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [307]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `dab_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [308]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `dab_els_vhigh`

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [309]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_els_low+dab_els_mod+dab_els_high+dab_els_vhigh)`

LONG — `sum_dab_els`

STATIC TEXT

E `sum_dab_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | dab_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_dab_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Settlement (North Sea): both in coastal and offshore waters (Bolle et al. 1994)*
- *Larvae need for their survival specific prey: dino-flagellates, followed by tintinnids and copepod nauplii (Last 1978)*

Low

NUMERIC: INTEGER — dab_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [310]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — dab_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [311]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — dab_ssr_high

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [312]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — dab_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [313]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_dab_ssr

`(dab_ssr_low+dab_ssr_mod+dab_ssr_high+dab_ssr_vhigh)`

STATIC TEXT

E `sum_dab_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER dab_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_dab_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

- *Spawning in Öresund strait, Arkona and Bornholm basin (Nissling et al. 2002)*
- *Spawning grounds offshore: 30-50 m (Henderson 1998)*
- *Age first reproduction (North Sea): 1-2 years, batch spawner (citations in Henderson 1998)*

Low

NUMERIC: INTEGER dab_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER dab_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER dab_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER dab_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_crs_low+dab_crs_mod+dab_crs_high+dab_crs_vhigh)`

LONG sum_dab_crs

STATIC TEXT

E `sum_dab_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER dab_crs_dtq
V1 `self.InRange(0,3) || self == null`	
M1 Value must be between 0 and 3	

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

POPULATION SPAWNING CYCLE

E `sum_dab_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Spawning period: Feb-May (Kattegat), March-June in SD 22 (Florin 2005)*
- *Jan-May (North Sea) (Van der Land 1991)*

Low	NUMERIC: INTEGER dab_spw_low
I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur And 49 other symbols [314]	
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

Moderate	NUMERIC: INTEGER dab_spw_mod
I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su And 105 other symbols [315]	
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

High	NUMERIC: INTEGER dab_spw_high
I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin And 204 other symbols [316]	
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

Very high I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli [And 134 other symbols [317]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER dab_spw_vhigh
VARIABLE `(dab_spw_low+dab_spw_mod+dab_spw_high+dab_spw_vhigh)`	LONG sum_dab_spw

STATIC TEXT

E `sum_dab_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER dab_spw_dtq

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_dab_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Optimal growth young dab: 15-18°C, >18°C decline in feeding and growth (Bolle et al. 1994)*
- *Sensitivity to phenological changes: Correlation with preceding winter temperature (North Sea) (Greve et al. 2005)*

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s [And 326 other symbols [318]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER dab_stt_low
Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat [And 336 other symbols [319]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER dab_stt_mod

High

NUMERIC: INTEGER — `dab_stt_high`

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [320]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `dab_stt_vhigh`

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [321]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_stt_low+dab_stt_mod+dab_stt_high+dab_stt_vhigh)`

LONG — `sum_dab_stt`

STATIC TEXT

E `sum_dab_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — `dab_stt_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

SENSITIVITY TO DECREASING SALINITY

E `sum_dab_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Eggs do not tolerate low salinity (Florin 2005)*
- *Eggs do not float below 12 psu (Temming 1989)*
- *Salinity at which 1% of the egg batches in the population will obtain neutral egg buoyancy is 17.8 psu (Nissling et al. 2002)*

Low

NUMERIC: INTEGER — `dab_sts_low`

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [322] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	dab_sts_mod
High I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [323] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	dab_sts_high
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [324] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	dab_sts_vhigh
VARIABLE `(dab_sts_low+dab_sts_mod+dab_sts_high+dab_sts_vhigh)`	LONG	sum_dab_sts

STATIC TEXT

E `sum_dab_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ________________________________	dab_sts_dtq

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_dab_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• *No data/information*

Low

dab_sta_low — NUMERIC: INTEGER

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [325]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

dab_sta_mod — NUMERIC: INTEGER

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [326]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

dab_sta_high — NUMERIC: INTEGER

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [327]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

dab_sta_vhigh — NUMERIC: INTEGER

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [328]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_sta_low+dab_sta_mod+dab_sta_high+dab_sta_vhigh)`

sum_dab_sta — LONG

STATIC TEXT

E `sum_dab_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

dab_sta_dtq — NUMERIC: INTEGER

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

POPULATION GROWTH RATE

E `sum_dab_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

Maximum growth rate (r_{max})	• No data /information
Von Bertalanffy K	• 0.19 (Western Baltic Sea), 0.25 (Baltic Sea)
Age at maturity (t_m)	• 2.3 years (North Sea)
Maximum age (t_{max})	• 12 years (North Sea)
Natural mortality (M)	• 0.37 (North Sea)
Maximum length (L_{inf})	• 33.4 cm TL

(www.fishbase.org) (Froese and Pauly 2021)

Low

NUMERIC: INTEGER dab_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [329]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER dab_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [330]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER dab_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [331]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER dab_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [332]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(dab_pgr_low+dab_pgr_mod+dab_pgr_high+dab_pgr_vhigh)`

LONG sum_dab_pgr

STATIC TEXT

E `sum_dab_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	dab_pgr_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	---------------------------------.	

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

SENSITIVITY TO OTHER STRESSORS

E `sum_dab_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• *Pathogens, predation, parasites (Henderson 1998)*
• *Juvenile dab showed reduced growth at 50% O_2-saturation (during 20 days period) (Kattegat) (Petersen and Pihl 1995)*
• *Dab were present in the Kattegat area down to 10-20% saturation level, assuming higher physiological tolerance to low oxygen, frequency of eating decreased during hypoxic (<30% O_2-saturation) (Kattegat) (Petersen and Pihl 1995)*
• *Toxic explosive compounds from dumpsite in Baltic Sea are accumulated in biles and pose a risk to fish health (Western Baltic Sea) (Koske et al. 2020)*

Low I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox And 323 other symbols [333] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ---------------------------------.	dab_ost_low
Moderate I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [334] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ---------------------------------.	dab_ost_mod
High I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [335] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ---------------------------------.	dab_ost_high
Very high I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda And 315 other symbols [336] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ---------------------------------.	dab_ost_vhigh
VARIABLE `(dab_ost_low+dab_ost_mod+dab_ost_high+dab_ost_vhigh)`	LONG	sum_dab_ost

STATIC TEXT

E `sum_dab_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: | NUMERIC: INTEGER | dab_ost_dtq

V1 `self.InRange(0,3) || self == null`
M1 Value must be between 0 and 3

KLIESCHE - COMMON DAB (LIMANDA LIMANDA)

DIRECTION OF EFFECTS

E `sum_dab_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive | NUMERIC: INTEGER | dab_doe_pos

V1 `self.InRange(0,4) || self == null`
M1 Value must be between 0 and 4

Neutral | NUMERIC: INTEGER | dab_doe_neu

V1 `self.InRange(0,4) || self == null`
M1 Value must be between 0 and 4

Negative | NUMERIC: INTEGER | dab_doe_neg

V1 `self.InRange(0,4) || self == null`
M1 Value must be between 0 and 4

VARIABLE | LONG | sum_dab_doe
(dab_doe_pos+dab_doe_neu+dab_doe_neg)

STATIC TEXT

E `sum_dab_doe != 4`

The attribute direction of change must have a sum of 4

Comments: | TEXT | dab_com

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

flounder

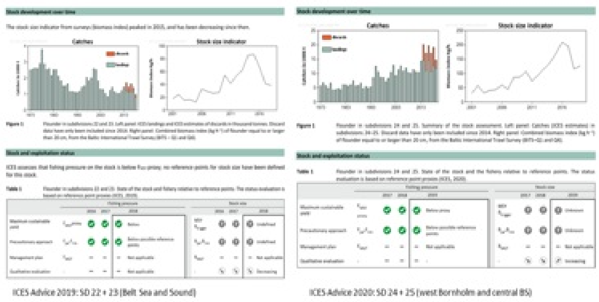
STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• In the Baltic Sea, *Platichthys* spp. distributed in all subdivisions, except SD 31+32 (Bagge and Steffensen 1989; Momigliano et al. 2018; Nissling et al. 2002) • Share of pelagic spawners (*P. flesus*) decreases from west to east (except in SD26) and share of demersal spawners (*P. solemdali*) increases (ICES 2021a): ○ Share of pelagic spawners: SD24 – 97%, SD25 – 76%, SD26 – 98%, SD28 – 24%, SD32 – 8%
Stock size	• Trend-based assessments (length-based indicator) for all Baltic flounder stocks (ICES 2021a) • No advice requested and given for stock SD22-23 (Western Baltic Sea): Stock size indicator peaked in 2015, has been decreasing since then (ICES 2019; ICES 2021a) • SD 24-25 (part western, part southern central Baltic Sea): stock size indicator peaked in 2016, then decreased with a slightly positive trend since 2018 (ICES 2021c) • No reference points (B_{MSY}, B_{pa}, MSY $B_{trigger\ proxy}$) defined for SD26+28 (*Platichthys* spp., central Baltic Sea) (ICES 2021d), SD24-25 (*Platichthys* spp., part western, part southern central Baltic Sea) (ICES 2021c), SD22-23 (*P. flesus*, western Baltic Sea) (ICES 2019) and North Sea, Skagerrak, Kattegat (*P. flesus*) (ICES 2021b)
Recruitment	• Recruitment success variability depends on fluctuations of hydrological conditions on spawning ground (Florin and Höglund 2008)
Growth	Growth faster at higher temperatures >14°C • Max. growth rate: ~18-20°C, (Fonds et al. 1992), >22°C feeding and growth decline (North Sea)

- Two sympatric flounder populations in the Baltic Sea, differing in spawning habitat and egg characteristics (Florin and Höglund 2008; Ustups et al. 2013)
- Just recently (2018) distinguished into two different species (*P. flesus* – pelagic-spawning lineage, *P. solemdali* – demersal-spawning lineage) (Momigliano et al. 2018)
- Flounder split up (currently) into four different stocks by ICES (ICES 2021a):
  - SD22-23: western Baltic Sea (mainly *P. flesus*)
  - SD24-25: part western, part southern central Baltic Sea (~80 % *P. flesus*, ~20 % *P. solemdali*)
  - SD26+28: east of Gotland and Gulf of Gdansk (central Baltic Sea; ~45 % *P. flesus*, ~55 % *P. solemdali*)
  - SD27+29-32: northern central and northern Baltic Sea (mixture of both species, mainly *P. solemdali* (Momigliano et al. 2018)
- Caught offshore as well as in coastal fisheries and with active as well as with passive fishing gear (Baltic Sea) (ICES 2021a)

STATIC TEXT



FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Sandy substrate (western Baltic Sea) (Rau et al. 2019)
• Feed in shallow waters and migrate to spawn in deeper waters with higher salinities or feed and spawn in shallow coastal areas or banks with lower salinities (Florin and Höglund 2008; Momigliano et al. 2018; Nissling and Dahlman 2010)
• Low salinity habitats are nursery grounds for juvenile flounder (North Sea) (Kafemann et al. 1996)
• Sand and gravel preferred over soft and stony substrate as nursery grounds (central Baltic Sea) (Florin et al. 2009)
• Age-0: preference for 0.2 and 0.6 m over 1 m depth, overlap with turbot age-0 (central Baltic Sea) (Martinsson and Nissling 2011)
• Juveniles occurred mainly at 1.5-5 m (Kattegat) (Pihl 1989)

Low

NUMERIC: INTEGER flo_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [337]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER flo_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [338]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER flo_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [339]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER flo_hab_vhigh

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [340]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_hab_low+flo_hab_mod+flo_hab_high+flo_hab_vhigh)`

LONG sum_flo_hab

STATIC TEXT

E `sum_flo_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER flo_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

PREY SPECIFICITY

E `sum_flo_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• < 40 mm: mainly copepods, followed by oligochatea and chironomidae; > 40 mm: oligochatea and chironomidae dominate diet, followed by amphipods (central Baltic Sea) (Nissling et al. 2007)
• Individuals ≤ 20 cm mainly feed on crustaceans (cumaceans) and polychates; with increasing size (> 20 cm), the share of molluscs and priapulida (worm-like animal) increases and that of crustaceans decreases (western Baltic Sea) (Arntz 1977)
• Bivalves dominate diet in spring and summer (western and southern central Baltic Sea) (Reßing 2020)
• < 30 cm also feed on isopods (central Baltic Sea) (Haase 2018)

Low

NUMERIC: INTEGER `flo_prey_low`

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [341]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `flo_prey_mod`

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [342]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `flo_prey_high`

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [343]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `flo_prey_vhigh`

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [344]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_prey_low+flo_prey_mod+flo_prey_high+flo_prey_vhigh)`

LONG `sum_flo_prey`

STATIC TEXT

E `sum_flo_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER flo_prey_dtq
V1 `self.InRange(0,3) || self == null`	- -
M1 Value must be between 0 and 3	

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

ADULT MOBILITY

E `sum_flo_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Flounder in the Baltic Sea represent a mixture of resident and very local species and migratory species (Bagge and Steffensen 1989; Florin 2005)

Low I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [345] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_mob_low -
Moderate I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [346] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_mob_mod -
High I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [347] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_mob_high -
Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_mob_vhigh -
VARIABLE `(flo_mob_low+flo_mob_mod+flo_mob_high+flo_mob_vhigh)`	LONG sum_flo_mob

STATIC TEXT

E `sum_flo_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER flo_mob_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_flo_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Pelagic eggs (Western Baltic Sea)
• Days until hatch (pelagic eggs): 4°C & 15-33 psu: ~11-13 days; 6°C & 15-33 psu: ~8-10 days; 8°C & 15-33 psu: ~6-7 days; 10°C & 15-33 psu: ~4-5 days (western Baltic Sea) (Westernhagen 1970)
• Pelagic larvae originating from the Baltic Sea deep basins drift to shallow, coastal areas, where they then settle and migrate to the close-by nursery grounds (central Baltic Sea) (Hinrichsen et al. 2018)

Low NUMERIC: INTEGER flo_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [348]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER flo_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [349]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER flo_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [350]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER flo_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [351]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE LONG sum_flo_els

`(flo_els_low+flo_els_mod+flo_els_high+flo_els_vhigh)`

STATIC TEXT

E sum_flo_els != 5

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER flo_els_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E sum_flo_els == 5

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Pelagic larvae originating from the Baltic Sea deep basins drift to shallow, coastal areas, where they then settle and migrate to the close-by nursery grounds (central Baltic Sea) (Hinrichsen et al. 2018)
• ~56 days from hatching to settling (central Baltic Sea) (Hinrichsen et al. 2018)
• Age-0: salinity < 5.8 psu negative effect on presence of flounder in nurseries (central Baltic Sea) (Florin et al. 2009)
• Settling age-0: April-July, shallow water, sandy bottom (Kattegat) (Pihl 1989)

Low

NUMERIC: INTEGER flo_ssr_low

I Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on s
And 245 other symbols [352]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER flo_ssr_mod

I Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is r
And 365 other symbols [353]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER flo_ssr_high

I Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependenc
And 310 other symbols [354]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high	NUMERIC: INTEGER flo_ssr_vhigh
I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi [And 236 other symbols [355]]	________________________________
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

VARIABLE	LONG sum_flo_ssr
`(flo_ssr_low+flo_ssr_mod+flo_ssr_high+flo_ssr_vhigh)`	

STATIC TEXT

E `sum_flo_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER flo_ssr_dtq
V1 `self.InRange(0,3) || self == null`	________________________________
M1 Value must be between 0 and 3	

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_flo_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Batch spawner (Nissling and Dahlman 2010)
• Migrations between shallow waters (feeding) to deep waters (spawning), in central/north Baltic: flounder spawn and feed in shallow waters, substantial movements (hundreds of km are reported) (Florin 2005; Florin and Höglund 2008)
• Specific spawning areas in SD22+23 (western Baltic Sea) are unknown; assumed to be deeper 20 m (Petereit et al. 2014)
• Two separate reproductive patterns:
• pelagic eggs associated with P. flesus (Momigliano et al. 2018), spawned offshore in deep basins (Nissling and Dahlman, 2010)
• demersal eggs associated with P. solemdali (Momigliano et al. 2018), spawned in shallow waters on banks or of coastal areas (Nissling and Dahlman 2010 and ref. therein), eggs have a thicker chorion (Lønning and Solemdal 1972) and are denser and smaller (Momigliano et al. 2018 and ref. therein) than the pelagic eggs
• Minimum salinity for pelagic eggs to be neutrally buoyant: 10-12 psu (Nissling et al. 2002)

Low I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `flo_crs_low` _
Moderate I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `flo_crs_mod` _
High I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `flo_crs_high` _
Very high I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `flo_crs_vhigh` _
VARIABLE `(flo_crs_low+flo_crs_mod+flo_crs_high+flo_crs_vhigh)`	LONG `sum_flo_crs`

STATIC TEXT

E `sum_flo_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `flo_crs_dtq` _

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

POPULATION SPAWNING CYCLE

E `sum_flo_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• *Spawning in Feb. –April (western Baltic Sea) (Arntz and Finger 1981)*

Low

NUMERIC: INTEGER flo_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [356]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER flo_spw_mod

I Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning su
And 105 other symbols [357]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER flo_spw_high

I One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [358]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER flo_spw_vhigh

I One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [359]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_spw_low+flo_spw_mod+flo_spw_high+flo_spw_vhigh)`

LONG sum_flo_spw

STATIC TEXT

E `sum_flo_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER flo_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_flo_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *4-6°C: Highest hatch rate (western Baltic Sea) (Von Westernhagen 1970)*
- *Eat more and grow faster at higher temperatures: >14°C, maximum growth rate at 18-20°C (Fonds et al. 1992)*
- *Temperature threshold: >22°C, strong reduction in feeding and growth (Fonds et al. 1992)*
- *Lethal limit: 26-27°C (in Fonds et al. 1992)*
- *Phenology changes – seasonal timing strongly negatively correlated with preceding winter temperature: colder winter postpone season, warmer winter cause season to start earlier (North Sea) (Greve et al. 2005)*

Low

NUMERIC: INTEGER — flo_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [360]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — flo_stt_mod

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [361]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — flo_stt_high

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [362]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — flo_stt_vhigh

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [363]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_stt_low+flo_stt_mod+flo_stt_high+flo_stt_vhigh)`

LONG — sum_flo_stt

STATIC TEXT

E `sum_flo_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER flo_stt_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	------------------------------

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_flo_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Euryhaline species (Solemdal 1970)*
- *At 33 psu during egg development: highest mean survival rate of hatched larvae; 15 psu threshold for successful egg development (western Baltic Sea) (von Westernhagen 1970)*
- *Egg development takes longer and hatch is delayed with decreasing salinity (western Baltic Sea) (von Westernhagen 1970)*
- *Threshold: successful development of pelagic eggs at ≥ 11 psu (Solemdal 1967); spermatozoa activity from flounder with pelagic eggs ≥ 10 psu; spermatozoa activity from flounder with demersal eggs ≥ 3 psu (Nissling et al. 2002)*
- *Minimum salinity for pelagic eggs to be neutrally buoyant: 10-12 psu (Nissling et al. 2002)*
- *Effect of variability in salinity on variability of year-classes of demersal spawners (central Baltic Sea) (Nissling and Wallin 2020)*
- *Age-0: salinity < 5.8 psu negative effect on presence in nursery areas (central Baltic Sea) (Florin et al. 2009)*
- *Preference of low salinity (0.5 psu) in postlarval flounder and early juveniles when finished metamorphosis (mouth of river Elbe, North Sea) (Bos and Thiel 2006)*

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_sts_low ------------------------------
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne And 3 other symbols [364] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_sts_mod ------------------------------
High I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [365] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_sts_high ------------------------------
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if And 28 other symbols [366] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER flo_sts_vhigh ------------------------------
VARIABLE `(flo_sts_low+flo_sts_mod+flo_sts_high+flo_sts_vhigh)`	LONG sum_flo_sts

STATIC TEXT

E `sum_flo_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER `flo_sts_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_flo_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low NUMERIC: INTEGER `flo_sta_low`

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [367]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER `flo_sta_mod`

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [368]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER `flo_sta_high`

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [369]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER `flo_sta_vhigh`

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [370]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (flo_sta_low+flo_sta_mod+flo_sta_high+flo_sta_vhigh)	LONG	sum_flo_sta

STATIC TEXT

E `sum_flo_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	flo_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

POPULATION GROWTH RATE

E `sum_flo_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (Froese and Pauly 2021)

Maximum growth rate (r_{max})	• Prior r= 0.56 (based on 5 stock assessments (Froese et al. 2017)
Von Bertalanffy K	• 0.23 & 0.38 (Kiel Bight, western Baltic Sea)
Age at maturity (t_m)	• 2 (Western Baltic Sea) (ICES 2014)
Maximum age (t_{max})	• 15 (Western Baltic Sea)
Natural mortality (M)	• 0.2 (Western Baltic Sea) (ICES 2014)
Maximum length (L_{inf})	• L_{inf} = 44 cm (♂ and ♀), SD22-23, western Baltic Sea) (ICES 2021a) • L_{inf} = 33 cm (♂ and ♀), SD24-25, part western, part southern central Baltic Sea) (ICES 2021a)

Low	NUMERIC: INTEGER	flo_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [371]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate	NUMERIC: INTEGER	flo_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [372]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `flo_pgr_high`

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [373]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `flo_pgr_vhigh`

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [374]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_pgr_low+flo_pgr_mod+flo_pgr_high+flo_pgr_vhigh)`

LONG — `sum_flo_pgr`

STATIC TEXT

E `sum_flo_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER — `flo_pgr_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_flo_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Climate change might have a negative impact on flounder recruitment in the BS, combined effects of temperature changes, precipitation and bottom water oxygen will decrease reproductive volume (Ustups et al. 2013)
• Presence of algae negatively affected predation efficiency and consumption of prey was much reduced in algal treatment compared to bare sand (central Baltic Sea) (Aarnio and Mattila 2000)
• Competition with invasive round goby: Goby abundance restricts flounder habitat utilization and food availability (central Baltic Sea) (Karlson et al. 2007)
• Sublethal oxygen saturations (30-40%) cause changes in physiology and predation behavior of juvenile flounder (central Baltic Sea) (Tallqvist et al. 1999)
• Reproductive volume (dissolved oxygen > 1 ml/l and salinity of 10.6-12 psu) significantly affects abundance of eggs and larvae from pelagic spawning flounder in the water column and climate change might have negative impact on flounder recruitment if it causes the reproductive volume to decrease (central Baltic Sea) (Ustups et al. 2013)

Low

NUMERIC: INTEGER flo_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [375]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER flo_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [376]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER flo_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [377]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER flo_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [378]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(flo_ost_low+flo_ost_mod+flo_ost_high+flo_ost_vhigh)`

LONG sum_flo_ost

STATIC TEXT

E `sum_flo_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER flo_ost_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUNDER - EUROPEAN FLOUNDER (PLATICHTHYS FLESUS)

DIRECTION OF EFFECTS

E `sum_flo_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER flo_doe_pos _
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER flo_doe_neu _
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER flo_doe_neg _
VARIABLE `(flo_doe_pos+flo_doe_neu+flo_doe_neg)`	LONG sum_flo_doe

STATIC TEXT

E `sum_flo_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT flo_com ....

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

plaice

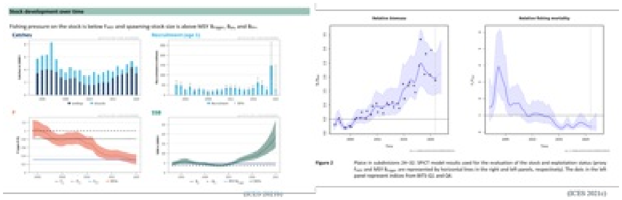
STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Baltic Sea eastwards to Gdansk Bay and northwards to Gotland area (Bagge and Steffensen 1989)
Stock size	• B_{MSY}=2*B_{pa} (Froese et al. 2021) • SD 21-23: Spawning stock size is above MSY $B_{trigger}$, B_{pa}, B_{lim} (ICES 2021b) • SD 21-23 (Kattegat, Belt Seas and the Sound): B_{pa}= 4.730 t, SSB(2022)=22.837 t: B/B_{MSY}=2.41 (ICES 2021b) • SD 24-32 (Baltic Sea): Relative value MSY $B_{trigger\ proxy}$: B/B_{MSY}= 0.5, relative spawning-stock size is above MSY $B_{trigger\ proxy}$ (ICES 2021c)
Recruitment	• Recruitment estimates age-1 high for 2020 (~147 million) (ICES 2021a)
Growth	• Max. growth rates in lengths of 0.5-0.6 mm/d at 12-14°C (Fonds et al. 1992) • Max growth rates about 18-20°C (Fonds et al. 1992), >22°C feeding and growth decreased

- Assumption of two stocks, Baltic stock in SD 24-25 and a Belt Sea stock in SD 22 (Bagge and Steffensen 1989)
- Plaice is mainly caught in the area of Arkona and Bornholm basin (SD 24-25) (ICES 2021a)

STATIC TEXT



SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Sediment characteristics important, positive relationship between grain size and densities (ICES 2006; Zijlstra et al. 1982)
• Nursery grounds: Shallow (0-3 m) sediment substratum during their early juvenile stage (citation in Ulrich et al. 2013)
• Recently metamorphosed (11–15 mm) and post-settlement (16–26 mm) juveniles showed a significant preference for bare sediment (Wennhage and Pihl 1994)
• Juveniles: 1.5-5 m, as 1-group also deeper water (Pihl 1989)

Low

NUMERIC: INTEGER — pla_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [379]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — pla_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [380]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High	NUMERIC: INTEGER	pla_hab_high
I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi [And 132 other symbols [381]]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		

Very high	NUMERIC: INTEGER	pla_hab_vhigh
I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater [And 164 other symbols [382]]		
V1 `self.InRange(0,5) || self == null`		
M1 Value must be between 0 and 5		

VARIABLE	LONG	sum_pla_hab
`(pla_hab_low+pla_hab_mod+pla_hab_high+pla_hab_vhigh)`		

STATIC TEXT

E `sum_pla_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	pla_hab_dtq
V1 `self.InRange(0,3) || self == null`		
M1 Value must be between 0 and 3		

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

PREY SPECIFICITY

E `sum_pla_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Juvenile (North Sea): mainly polychaetes, postlarval Crangon and siphons of bivalves (Beyst et al. 1999)
• Brown shrimp (Crangon crangon) shows to be the most predominant prey item in 0-group plaice (North Sea) (Heindler et al. 2019)
• North Sea: Stomach content dominated by polychaetes (Pectinaria, Nereis, Lanice, Magelona) (Rijnsdorp and Vingerhoed 2001)

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
[And 164 other symbols [383]]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pla_prey_low`

Moderate

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
[And 184 other symbols [384]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pla_prey_mod`

High

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
[And 212 other symbols [385]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pla_prey_high`

Very high

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
[And 104 other symbols [386]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pla_prey_vhigh`

VARIABLE

`(pla_prey_low+pla_prey_mod+pla_prey_high+pla_prey_vhigh)`

LONG — `sum_pla_prey`

STATIC TEXT

E `sum_pla_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `pla_prey_dtq`

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

ADULT MOBILITY

E `sum_pla_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Spawning site fidelity (Hunter et al. 2003)
• Directed seasonal migrations from he winter spawning area (Dogger Bank Tail End) to summer feeding grounds 250 km to the north in deep, cold, thermally stratified water (North Sea) (Hunter et al. 2003)
• Usage of tidal streams to assist with navigation and transport (citation in Hunter et al. 2003; ICES 2006)

Low

NUMERIC: INTEGER — pla_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [387]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — pla_mob_mod

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [388]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — pla_mob_high

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [389]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — pla_mob_vhigh

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pla_mob_low+pla_mob_mod+pla_mob_high+pla_mob_vhigh)`

LONG — sum_pla_mob

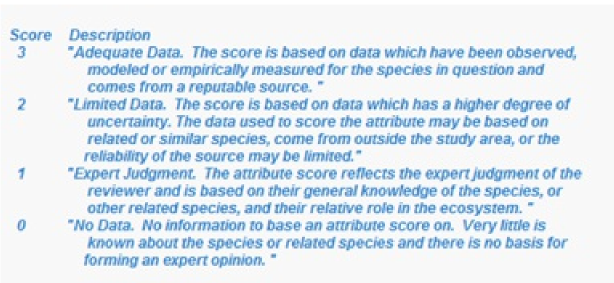
STATIC TEXT

E `sum_pla_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — pla_mob_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DISPERSAL OF EARLY LIFE STAGES

E `sum_pla_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Eggs and larvae are transported to nursery areas by Baltic surface current and wind-induced on-shore currents (Kattegat) (Pihl 1989)
• Egg and larval stages duration: 3-4 months, young plaice settle in areas far away from spawning area (North Sea) (ICES 2006)
• Dispersal characteristics of the survival yolk sac larvae reflected retention within the Belt Sea or northwards transport through the Great Belt into Kattegat and partly into Skagerrak (Petereit et al. 2014)

Low I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita And 39 other symbols [390] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_els_low` _________________
Moderate I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot And 56 other symbols [391] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_els_mod` _________________
High I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne And 47 other symbols [392] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_els_high` _________________
Very high I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni And 93 other symbols [393] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_els_vhigh` _________________
VARIABLE `(pla_els_low+pla_els_mod+pla_els_high+pla_els_vhigh)`	LONG `sum_pla_els`

STATIC TEXT

E `sum_pla_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER pla_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_pla_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Ontogenetic shift: Spawning in southern North Sea, eggs drift to coastal areas, juveniles are found along the coast, as sizes increases plaice shift offshore (Rijnsdorp and Van Beek 1991)
• Long pelagic phase (3-4 months), settlement far away from spawning area, settling after metamorphosis (13-14 mm) (ICES 2006; Russell 1976)
• Sediment characteristics important during settlement (ICES 2006)
• Larvae settle on soft sediments in puddles on tidal flats during first weeks after metamorphosis (Berghahn 1983)
• Ontogenetic shift: Spawning in southern North Sea, eggs drift to coastal areas, juveniles are found along the coast, as sizes increases plaice shift offshore (Rijnsdorp and Van Beek 1991)

Low NUMERIC: INTEGER pla_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [394]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER pla_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [395]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER pla_ssr_high

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [396]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER pla_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [397]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (pla_ssr_low+pla_ssr_mod+pla_ssr_high+pla_ssr_vhigh)	LONG	sum_pla_ssr

STATIC TEXT

E `sum_pla_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	*"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."*
2	*"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."*
1	*"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."*
0	*"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."*

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ________________	pla_ssr_dtq

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_pla_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

- *North Sea: Spawning offshore in restricted areas, eggs and larvae are transported to coastal nurseries (ICES 2006)*
- *Males become sexually mature at age 2-3, females mature later (4-5 year) (ICES 2006)*
- *Spawning site fidelity (Hunter et al. 2003)*

Low I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________	pla_crs_low
Moderate I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________	pla_crs_mod
High I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________	pla_crs_high

Very high

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER pla_crs_vhigh

VARIABLE

`(pla_crs_low+pla_crs_mod+pla_crs_high+pla_crs_vhigh)`

LONG sum_pla_crs

STATIC TEXT

E `sum_pla_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER pla_crs_dtq

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

POPULATION SPAWNING CYCLE

E `sum_pla_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Peak spawning: Jan-Feb (German Bight) (ICES 2006; Rijnsdorp 1989)*
- *Spawning season November to March (Muus and Nielsen 1999)*

Low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur

And 49 other symbols [398]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER pla_spw_low

Moderate

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su

And 105 other symbols [399]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER pla_spw_mod

High

NUMERIC: INTEGER pla_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [400]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER pla_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [401]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pla_spw_low+pla_spw_mod+pla_spw_high+pla_spw_vhigh)`

LONG sum_pla_spw

STATIC TEXT

E `sum_pla_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER pla_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_pla_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Different temperature ranges for different life stages: potential avoidance of warmer coastal waters (North Sea) (Teal et al. 2012)*
- *Plaice have lower optimal growth temperature and lower thermal tolerance (Teal et al. 2012)*
- *Max. growth at 18-20°C, lethal limit: 26-27°C (in Fonds et al. 1992)*
- *Optimum temperature (Baltic Sea): 6°C (von Westernhagen 1970)*
- *Juveniles grow faster at higher temperatures, adult plaice grow faster at low temperature: habitat differentiation (Fonds et al. 1992; van der Sleen et al. 2018)*
- *Sensitivity to phenological changes: Correlation with preceding winter temperature (North Sea) (Greve et al. 2005)*

Low

NUMERIC: INTEGER `pla_stt_low`

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [402]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `pla_stt_mod`

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [403]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `pla_stt_high`

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [404]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `pla_stt_vhigh`

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [405]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pla_stt_low+pla_stt_mod+pla_stt_high+pla_stt_vhigh)`

LONG `sum_pla_stt`

STATIC TEXT

E `sum_pla_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER `pla_stt_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

SENSITIVITY TO DECREASING SALINITY

E `sum_pla_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• High egg mortality: below 17.5 psu, yolk-sac larvae tolerated salinities between 15 and 60 psu over one week (Holliday and Jones 1967)
• Optimum salinity (Baltic Sea): 20 psu (von Westernhagen 1970)
• Rearing of eggs at low salinity decreases speed of development (von Westernhagen 1970)
• Fertilization experiment performed at salinities between 8 and 15 psu showed a low percentage of fertilized eggs at low salinities, successful fertilization was low and variable at 9–12 psu and increased with salinity up to 15 psu (Baltic Sea) (Nissling et al. 2002)

Low

NUMERIC: INTEGER — `pla_sts_low`

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `pla_sts_mod`

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne

And 3 other symbols [406]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `pla_sts_high`

I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r

And 27 other symbols [407]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `pla_sts_vhigh`

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if

And 28 other symbols [408]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pla_sts_low+pla_sts_mod+pla_sts_high+pla_sts_vhigh)`

LONG — `sum_pla_sts`

STATIC TEXT

E `sum_pla_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER pla_sts_dtq - .

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_pla_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [409] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pla_sta_low - .
Moderate I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [410] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pla_sta_mod - .
High I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [411] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pla_sta_high - .
Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [412] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pla_sta_vhigh - .
VARIABLE `(pla_sta_low+pla_sta_mod+pla_sta_high+pla_sta_vhigh)`	LONG sum_pla_sta

STATIC TEXT

E `sum_pla_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER pla_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

POPULATION GROWTH RATE

E `sum_pla_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• F_{MSY}=0.31 (Kattegat, Belt Seas and Sound) (ICES 2021b) • r=0.62 (SD 21-23)
Von Bertalanffy K	• 0.15 (Baltic Sea) -0.17 (Kattegat, Belt Sounds)
Age at maturity (t_m)	• 2-3 years (North Sea) (Rijnsdorp 1993)
Maximum age (t_{max})	• 10 (Baltic Sea)
Natural mortality (M)	• 0.1-0.2 (age-1) (Baltic Sea) (ICES 2021a)
Maximum length (L_{inf})	• 54 cm TL

(Froese and Pauly 2021)

Low

NUMERIC: INTEGER pla_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [413]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER pla_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [414]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER pla_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [415]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 And 79 other symbols [416] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_pgr_vhigh` ________________________________
VARIABLE `(pla_pgr_low+pla_pgr_mod+pla_pgr_high+pla_pgr_vhigh)`	LONG `sum_pla_pgr`

STATIC TEXT

E `sum_pla_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `pla_pgr_dtq` ________________________________

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

SENSITIVITY TO OTHER STRESSORS

E `sum_pla_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Juvenile plaice showed reduced growth at 30% O_2-saturation (during 20 days period), few individuals were found in the Kattegat area down to 10-20% saturation level (Petersen and Pihl 1995)
• Frequency of eating decreased during hypoxic (<30% O_2-saturation) (Petersen and Pihl 1995)

• Growth changes of the smaller size classes were significantly correlated with indices of plaice density, eutrophication, and seabed disturbance by beam trawling. They could be related to spatial and temporal patterns in variations in eutrophication and beam trawling (North Sea) (Rijnsdorp and van Leeuwen 1996)
• No correlation was observed with temperature (North Sea) (Rijnsdorp and van Leeuwen 1996)

Low I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox And 323 other symbols [417] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pla_ost_low` ________________________________

Moderate I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [418] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	pla_ost_mod
High I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [419] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	pla_ost_high
Very high I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda And 315 other symbols [420] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER	pla_ost_vhigh
VARIABLE `(pla_ost_low+pla_ost_mod+pla_ost_high+pla_ost_vhigh)`	LONG	sum_pla_ost

STATIC TEXT

E `sum_pla_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER	pla_ost_dtq

SCHOLLE - EUROPEAN PLAICE (PLEURONECTES PLATESSA)

DIRECTION OF EFFECTS

E `sum_pla_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	pla_doe_pos

Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER pla_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER pla_doe_neg
VARIABLE `(pla_doe_pos+pla_doe_neu+pla_doe_neg)`	LONG sum_pla_doe

STATIC TEXT

E `sum_pla_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT pla_com

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Occurs regularly in Skagerrak and Kattegat and occasionally in the western Baltic Sea (Florin 2005; Muus and Nielsen 1999)
Stock size	• Analytical assessment (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a) • Low productivity since 2004 (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a) • Spawning stock biomass increased to above $B_{trigger}$ in recent years (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a) • Fishing mortality decreased continuously since mid-1990s and is below FMSY since 2017; could be the reason why spawning stock biomass increased in recent years (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a) • Skagerrak, Kattegat, western Baltic Sea: MSY $B_{trigger}$ = B_{pa}= 2,600 t; SSB(2022) = 3,756 t (ICES 2021c) • B_{MSY} = 2 x MSY $B_{trigger}$ (Froese et al. 2021) • B/B_{MSY} = 0.72 • North Sea: MSY B $_{trigger}$ = B_{pa}= 42,838 t; SSB(2022) = 58,617 t (ICES 2021b) • B/B_{MSY} = 0.68 (North Sea)
Recruitment	• Low recruitment since 2004 with an increase recent years (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a; ICES 2021c)
Growth	• Growth rates not stable over time (for North Sea), after increase in size at age during 1960s, reaching a peak in 1970s, growth rate has decreased steadily (possible explanation: declining inputs of nutrients, reduced food) (Rijnsdorp et al. 2004; Van Beek et al. 1989)

- Mainly caught in mixed fishery as valuable bycatch (in plaice and cod gillnet fishery and in nephrops trawl fishery) (Skagerrak, Kattegat) (ICES 2021a)
- economically important for Danish fishery (ICES 2021a)
- SD20-SD24 considered as one stock (ICES 2021a)
- Validation needed on stock structure (Skagerrak, Kattegat, western Baltic Sea) and on connectivity to adjacent stocks (North Sea) (ICES 2021a)

STATIC TEXT

Figure 1 Sole in subdivisions 20–24. Summary of the stock assessment. The assumed recruitment value for 2021 is shaded in a lighter colour.

(ICES 2021c)

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Adults most abundant in waters down to 40 m with seabed characterized by fine sediment (North Sea) (Rijnsdorp et al. 1992)
• Age-0: at 1.5-5 m, age-1 also in deeper water down to about 11 m (Kattegat) (Pihl 1989)
• Nurseries: sandy or muddy coastal areas down to 20 m but mainly at depths less than 10 m (North Sea) (Rijnsdorp et al. 1992)
• Spawn in shallow waters and during non-spawning prefer deeper waters (North Sea) (ICES 1965)
• Spawn in inshore waters within 30 m depth (North Sea) (Borremans 1987 and ref. therein)

Low

NUMERIC: INTEGER `sol_hab_low`

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [421]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `sol_hab_mod`

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [422]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `sol_hab_high`

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [423]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `sol_hab_vhigh`

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [424]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sol_hab_low+sol_hab_mod+sol_hab_high+sol_hab_vhigh)`

LONG `sum_sol_hab`

STATIC TEXT

E `sum_sol_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER `sol_hab_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

PREY SPECIFICITY

E `sum_sol_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• *Sole are nocturnal and feed during the night (North Sea) (Kruuk 1963)*
• *Lab-reared pelagic larvae fed on copepods, polychaete larvae (Fonds 1979)*
• *Juveniles < 50 mm: mainly copepods and cumacea; juveniles ≥ 50 mm: polychaetes and amphipods (North Sea) (Amara et al. 2001)*
• *Juveniles also feed on caridean shrimp (North Sea) (Beyst et al. 1999)*
• *Adults mainly feed on polychaetes; on a few occasions also on echinoderms and molluscs (North Sea) (Braber and de Groot 1973)*

Low

NUMERIC: INTEGER sol_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [425]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sol_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [426]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sol_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [427]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sol_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [428]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sol_prey_low+sol_prey_mod+sol_prey_high+sol_prey_vhigh)`

LONG sum_sol_prey

STATIC TEXT

E `sum_sol_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER sol_prey_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	------------------------------------

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

ADULT MOBILITY

E `sum_sol_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• *Sole is assumed to be rather stationary (despite during spawning) (North Sea) (ICES 1965)*

Low I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [429] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sol_mob_low ------------------------------------
Moderate I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [430] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sol_mob_mod ------------------------------------
High I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [431] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sol_mob_high ------------------------------------
Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sol_mob_vhigh ------------------------------------
VARIABLE `(sol_mob_low+sol_mob_mod+sol_mob_high+sol_mob_vhigh)`	LONG sum_sol_mob

STATIC TEXT

E `sum_sol_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER sol_mob_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

DISPERSAL OF EARLY LIFE STAGES

E `sum_sol_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

- *Pelagic eggs and larvae transported by residual currents along the coast (North Sea) (Fonds 1979 and ref. therein)*
- *At 10°C hatching after 7-8 days (size 2.5-4 mm) (North Sea) (ICES 2006 and ref. therein)*
- *At 10°C hatching after ~ 6.5 days (North Sea) (Fonds 1979)*
- *~3 weeks after hatching post-larvae settle (Fonds 1979; ICES 2006)*
- *After yolk-sac absorption: active swimming first-feeding larvae (4-4.5 mm) (Fonds 1979)*

Low

NUMERIC: INTEGER sol_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [432]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sol_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [433]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sol_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [434]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sol_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [435]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

LONG sum_sol_els

`(sol_els_low+sol_els_mod+sol_els_high+sol_els_vhigh)`

STATIC TEXT

E `sum_sol_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER sol_els_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_sol_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Ambient temperature is between 10-15°C during larval stage (North Sea) (ICES 2006 and ref. therein)*
- *After metamorphosis: post-larvae settle on bottom at length of 7-10 mm (~3 weeks after hatching) (North Sea) (Fonds 1979; ICES 2006)*
- *Settlement of post-larvae close to spawning area (North Sea) (Rijnsdorp et al. 1992)*
- *Settling age-0: April-July in shallow water (Kattegat) (Pihl 1989)*
- *Age-0: mainly at 1.5-5 m, age-1 also in deeper water down to about 11 m (Kattegat) (Pihl 1989)*
- *Juveniles spend their first year in shallow coastal waters and estuaries; when older dispersal to deeper waters (North Sea) (ICES 2006)*

Low	NUMERIC: INTEGER sol_ssr_low
I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [436] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	
Moderate	NUMERIC: INTEGER sol_ssr_mod
I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [437] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	

High	NUMERIC: INTEGER sol_ssr_high
I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc [And 310 other symbols [438]]	------------------------------------
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	
Very high	NUMERIC: INTEGER sol_ssr_vhigh
I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi [And 236 other symbols [439]]	------------------------------------
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	
VARIABLE `(sol_ssr_low+sol_ssr_mod+sol_ssr_high+sol_ssr_vhigh)`	LONG sum_sol_ssr

STATIC TEXT

E `sum_sol_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER sol_ssr_dtq
V1 `self.InRange(0,3) || self == null`	------------------------------------
M1 Value must be between 0 and 3	

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_sol_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• High migratory, assuming to return to the same spawning areas, indications of spawning site fidelity (North Sea) (ICES 1965; ICES 2006)
• Long-distance migrations from deeper waters to shallow spawning sites along the coasts (central North Sea) (ICES 1965)
• Water temperature assumed to trigger spawning migration (North Sea) (ICES 1965)
• Migration to spawning site and start of reproduction at ~ 7°C (North Sea) (Fonds 1979 and ref. therein; ICES 1965)
• Spawn in inshore waters within 30 m depth (North Sea) (Borremans 1987 and ref. therein)

Low

NUMERIC: INTEGER — sol_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — sol_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — sol_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — sol_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sol_crs_low+sol_crs_mod+sol_crs_high+sol_crs_vhigh)`

LONG — sum_sol_crs

STATIC TEXT

E `sum_sol_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — sol_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

POPULATION SPAWNING CYCLE

E `sum_sol_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• April – June at the west coast of Denmark (North Sea) (ICES 1965)
• April – August, with a main period in May (North Sea) (Borremans 1987 and ref. therein)

Low I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur And 49 other symbols [440] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------	`sol_spw_low`
Moderate I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su And 105 other symbols [441] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------	`sol_spw_mod`
High I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin And 204 other symbols [442] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------	`sol_spw_high`
Very high I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli And 134 other symbols [443] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER -------------------------------	`sol_spw_vhigh`
VARIABLE `(sol_spw_low+sol_spw_mod+sol_spw_high+sol_spw_vhigh)`	LONG	`sum_sol_spw`

STATIC TEXT

E `sum_sol_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER -------------------------------	`sol_spw_dtq`

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_sol_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Water temperature assumed to trigger spawning migration (North Sea) (ICES 1965)
• Migration to spawning site and start of reproduction at ~ 7°C (North Sea) (Fonds 1979 and ref. therein; ICES 1965)
• Temperature tolerance increases during ontogenesis (Irvin 1974)
• Temperature thresholds: at 19°C little viable hatch and many embryos were deformed, at 22°C no viable hatch, lower limit at 7°C eggs (Fonds 1979)
• Egg survival: 7-19°C; growth larvae: 10-21°C (Fonds 1979)
• Successful egg development: 7-16°C (Irvin 1974)
• Strong positive correlation between growth rate of larvae and temperature at 10-16°C (Fonds 1979)
• Upper lethal limits for yolk-sac larvae (23°C), first-feeding larvae (24°C) and metamorphosing larvae (28°C) (Irvin 1974)
• Age-0: positive correlation between length and mean temperature during 2nd and 3rd quarter (North Sea) (Rijnsdorp et al. 2004)
• Sensitivity to phenological changes – seasonal timing strongly negatively correlated with preceding winter temperature: colder winter postpone season, warmer winter cause season to start earlier (North Sea) (Greve et al. 2005)
• Phenology changes– in recent decades, shift of mean peak spawning week towards earlier in the year; accompanied by an increase of winter sea surface temperature preceding the spawning (partially in North Sea) (Fincham et al. 2013)
• Sole are assumed to stay in deeper waters during winter in order to avoid cold water along the coasts (ICES 1965; Woodhead 1964)

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [444] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `sol_stt_low` ________________________________
Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [445] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `sol_stt_mod` ________________________________
High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [446] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `sol_stt_high` ________________________________
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [447] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `sol_stt_vhigh` ________________________________
VARIABLE `(sol_stt_low+sol_stt_mod+sol_stt_high+sol_stt_vhigh)`	LONG `sum_sol_stt`

STATIC TEXT

E `sum_sol_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER sol_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

SENSITIVITY TO DECREASING SALINITY

E `sum_sol_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *20-40 psu: high egg survival and normal development (Fonds 1979)*
- *> 30 psu: eggs and larvae float (Fonds 1979)*
- *< 30 psu: eggs and larvae sank to bottom and showed mortality due to crowding and probably respiratory stress (Fonds 1979)*
- *At 10 psu: survival was reduced; if larvae hatched they were deformed; larvae failed to swim (Fonds 1979)*
- *At > 50 psu: survival was reduced; many larvae failed to hatch; if larvae hatched they were deformed (Fonds 1979)*

Low

NUMERIC: INTEGER sol_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sol_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne
And 3 other symbols [448]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sol_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [449]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sol_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if
And 28 other symbols [450]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (sol_sts_low+sol_sts_mod+sol_sts_high+sol_sts_vhigh)	LONG	sum_sol_sts

STATIC TEXT

E sum_sol_sts != 5

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — sol_sts_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E sum_sol_sts == 5

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• *No data/information*

Low — NUMERIC: INTEGER — sol_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect

And 118 other symbols [451]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — sol_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when

And 127 other symbols [452]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — sol_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi

And 118 other symbols [453]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [454]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER sol_sta_vhigh

---------------------------------.

VARIABLE

`(sol_sta_low+sol_sta_mod+sol_sta_high+sol_sta_vhigh)`

LONG sum_sol_sta

STATIC TEXT

E `sum_sol_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER sol_sta_dtq

---------------------------------.

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

POPULATION GROWTH RATE

E `sum_sol_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- $r=2*F_{MSY}=1*F_{pa}$ (Froese et al. 2017)

Maximum growth rate (r_{max})	• Skagerrak, Kattegat and western Baltic Sea: F_{MSY} = 0.26 (ICES 2021c), r ≈ 0.52 • North Sea: F_{MSY} = 0.21 (ICES 2021b), r ≈ 0.42 (North Sea)
Von Bertalanffy K	• 0.3 (North Sea) (de Veen 1976)
Age at maturity (t_m)	• ♀: 3 years (North Sea) (Mollet et al. 2007)
Maximum age (t_{max})	• 8 (North Sea)
Natural mortality (M)	• unknown, assumed to be 0.1 (Skagerrak, Kattegat, western Baltic Sea) (ICES 2021a)
Maximum length (L_{inf})	• 35 cm (♂ and ♀) (North Sea) (de Veen 1976)

(Froese and Pauly 2021)

Low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [455]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER sol_pgr_low

---------------------------------.

Moderate

NUMERIC: INTEGER sol_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.

And 60 other symbols [456]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sol_pgr_high

I Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25

And 88 other symbols [457]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sol_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25

And 79 other symbols [458]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sol_pgr_low+sol_pgr_mod+sol_pgr_high+sol_pgr_vhigh)`

LONG sum_sol_pgr

STATIC TEXT

E `sum_sol_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER sol_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

SENSITIVITY TO OTHER STRESSORS

E `sum_sol_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Hypoxic conditions: significant decrease of max. metabolic rate: below 75% air saturation, sig. decrease in max. heart rate was recorded below 50% (Lefrançois and Claireaux 2003)
• Growth rates not stable over time: increase in length at age since mid 1960s, peak in 1970s, steady decrease in length at age since mid 1980s; possible explanation: declining input of nutrients, change in benthic productivity, reduced prey

availability (North Sea) (Rijnsdorp et al. 2004)

Low

NUMERIC: INTEGER sol_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [459]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sol_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [460]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sol_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [461]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sol_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [462]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sol_ost_low+sol_ost_mod+sol_ost_high+sol_ost_vhigh)`

LONG sum_sol_ost

STATIC TEXT

E `sum_sol_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER sol_ost_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEZUNGE - COMMON SOLE (SOLEA SOLEA)

DIRECTION OF EFFECTS

E `sum_sol_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

	Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER sol_doe_pos
	Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER sol_doe_neu
	Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER sol_doe_neg
	VARIABLE (sol_doe_pos+sol_doe_neu+sol_doe_neg)	LONG sum_sol_doe

STATIC TEXT

E `sum_sol_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT sol_com

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

`mullet`

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Atlantic coastal waters, Norway, Mediterranean Sea, sometimes migrating into lower course of rivers (Maitland and Linsell 2007) • Expansion of its native habitats into North Sea and brackish Baltic Sea (Schaber et al. 2011) • Occurrence in the Western Baltic during warm months (Schaber et al. 2011)
Stock size	• No data/information
Recruitment	• No data/information
Growth	• Growth not affected by salinity (Cardona 2006)

- Grey mullets of the family Mugilidae are amongst the most flexible and variable of catadromous fishes, but all of them, whether catadromous, facultative marine wanderers, or entirely marine, spawn at sea (McDowall 1997)
- Mullets in the Baltic Sea: *Chelon labrosus*, *Liza aurata*, *Liza ramada*, *Mugil mugil* (Expert information)
- *Chelon labrosus* potential climate change winner (Expert information)

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Preference for inshore areas, estuaries and river mouths (Hickling 1970; Schaber et al. 2011)
• Adults: Most of the population was found in mesohaline and polyhaline sites in winter and spring, in summer most concentrated in oligohaline sites (Cardona 2006)

Low

NUMERIC: INTEGER `mul_hab_low`

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul

And 124 other symbols [463]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `mul_hab_mod`

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts

And 19 other symbols [464]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `mul_hab_high`

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi

And 132 other symbols [465]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `mul_hab_vhigh`

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater

And 164 other symbols [466]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (mul_hab_low+mul_hab_mod+mul_hab_high+mul_hab_vhigh)	LONG	sum_mul_hab

STATIC TEXT

E `sum_mul_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — mul_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

PREY SPECIFICITY

E `sum_mul_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Filtration (gill trap apparatus): Detritus, algae, benthic organisms, long intestine indicates consumption of plants (Gebhardt and Ness 2004)*
- *Meiofauna in the top soil layer (Expert information)*
- *Unusual food intake: Spezialized, but not limited to specific organisms of meiofauna (preying on several species) (Expert information)*
- *Opportunistic feeder: Insensitive to climate change scenarios (moderate) (Expert information)*
- *Juveniles feed on zooplankton; Adults feed on benthic diatoms, epiphytic algae, small invertebrates and detritus (www.fishbase.org, Froese and Pauly 2021)*

Low — NUMERIC: INTEGER — mul_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [467]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — mul_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [468]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `mul_prey_high`

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i

And 212 other symbols [469]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `mul_prey_vhigh`

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles

And 104 other symbols [470]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mul_prey_low+mul_prey_mod+mul_prey_high+mul_prey_vhigh)`

LONG `sum_mul_prey`

STATIC TEXT

E `sum_mul_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER `mul_prey_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

ADULT MOBILITY

E `sum_mul_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Adults move northward in spring and summer with rising temperatures (Heessen et al. 2015)*
- *No distinct migration pathways, periodical migration between waters of different salinities, some species solitary (Schaber et al. 2011)*
- *Seasonally migrate between their "native" habitats in the adjacent North Sea and the western/southwestern Baltic Sea along the North Sea coast (during warm summer) (Schaber et al. 2011)*
- *"Summer visitors" from the Bay of Biscay and the English Channel, nowadays eggs and juveniles are found in the Wadden Sea (North Sea) (Expert information)*
- *Assumption that mullets are spawning along the Netherlands, last summer no catches of mullets recorded in the Wadden Sea (North Sea) (Expert information)*
- *Spawning areas are unknown (potentially English Channel) (Expert information)*
- *Baltic Sea: Pelagic eggs are observed in Skagerrak-Kattegat area (Baltic Sea) (Expert information)*

Low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [471]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_mob_low`

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [472]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_mob_mod`

High

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [473]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_mob_high`

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_mob_vhigh`

VARIABLE
`(mul_mob_low+mul_mob_mod+mul_mob_high+mul_mob_vhigh)`

LONG `sum_mul_mob`

STATIC TEXT

E `sum_mul_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER `mul_mob_dtq`

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_mul_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• *Pelagic eggs, dispersal is high, development time is short (Expert information)*
• *Juveniles around 2.0 cm SL move to coastal lagoons and estuaries in April-June, moving to sea in summer (Kottelat and Freyhof 2007)*

Low I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita And 39 other symbols [474] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_els_low` -
Moderate I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot And 56 other symbols [475] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_els_mod` -
High I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne And 47 other symbols [476] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_els_high` -
Very high I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni And 93 other symbols [477] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_els_vhigh` -
VARIABLE `(mul_els_low+mul_els_mod+mul_els_high+mul_els_vhigh)`	LONG `sum_mul_els`

STATIC TEXT

E `sum_mul_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `mul_els_dtq` -

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_mul_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Eggs are planktonic (Heessen et al. 2015), larvae are pelagic (Froese and Pauly 2021)*
- *Larvae are rather underdeveloped at hatching (TL ~ 4mm), at 12 days larvae have juvenile head (Boglione et al. 1992)*
- *The juvenile stage is reached precociously, at 60 days (Boglione et al. 1992)*

Low

NUMERIC: INTEGER — `mul_ssr_low`

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [478]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `mul_ssr_mod`

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [479]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `mul_ssr_high`

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [480]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `mul_ssr_vhigh`

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [481]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mul_ssr_low+mul_ssr_mod+mul_ssr_high+mul_ssr_vhigh)`

LONG — `sum_mul_ssr`

STATIC TEXT

E `sum_mul_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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Data Quality Score:	NUMERIC: INTEGER mul_ssr_dtq
V1 `self.InRange(0,3) || self == null`	
M1 Value must be between 0 and 3	

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_mul_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• *Offshore spawning with juveniles appearing in inshore areas (Hickling 1970; Schaber et al. 2011)*

Low I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mul_crs_low
Moderate I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mul_crs_mod
High I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mul_crs_high
Very high I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER mul_crs_vhigh
VARIABLE `(mul_crs_low+mul_crs_mod+mul_crs_high+mul_crs_vhigh)`	LONG sum_mul_crs

STATIC TEXT

E `sum_mul_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
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Data Quality Score:

NUMERIC: INTEGER mul_crs_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

POPULATION SPAWNING CYCLE

E sum_mul_crs == 5

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• January to April (North Sea) (Hickling 1970)
• Winter spawner (3-7 months spawning season, probably more extended season in southern parts/tropics) (Expert information)

Low

NUMERIC: INTEGER mul_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [482]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mul_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [483]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mul_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [484]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mul_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [485]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

VARIABLE

(mul_spw_low+mul_spw_mod+mul_spw_high+mul_spw_vhigh)

LONG sum_mul_spw

STATIC TEXT

E `sum_mul_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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Data Quality Score:

NUMERIC: INTEGER — `mul_spw_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_mul_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *High temperature tolerance , migrating to Western Baltic Sea during summer (Schaber et al. 2011)*
- *Tolerance against high temperature, potentially more sensitive to cold water (Expert information)*

Low

NUMERIC: INTEGER — `mul_stt_low`

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [486]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `mul_stt_mod`

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [487]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `mul_stt_high`

I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [488]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp
And 341 other symbols [489]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_stt_vhigh`

VARIABLE

`(mul_stt_low+mul_stt_mod+mul_stt_high+mul_stt_vhigh)`

LONG `sum_mul_stt`

STATIC TEXT

E `sum_mul_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER `mul_stt_dtq`

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_mul_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Adults are highly euryhaline (Schaber et al. 2011)*
- *Laboratory experiments with fry: High salinity tolerance with mortalities > 45 psu (Hotos and Vlahos 1998)*
- *Extremely euryhaline, high tolerance against salinity, also live in fresh water (Expert information)*

Low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_sts_low`

Moderate

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne
And 3 other symbols [490]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `mul_sts_mod`

High

I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [491]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `mul_sts_high`

_ _

Very high

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if
And 28 other symbols [492]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `mul_sts_vhigh`

_ _

VARIABLE

`(mul_sts_low+mul_sts_mod+mul_sts_high+mul_sts_vhigh)`

LONG — `sum_mul_sts`

STATIC TEXT

E `sum_mul_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `mul_sts_dtq`

_ _

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_mul_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

I Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [493]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `mul_sta_low`

_ _

Moderate I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [494] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	mul_sta_mod
High I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [495] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	mul_sta_high
Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [496] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	mul_sta_vhigh
VARIABLE `(mul_sta_low+mul_sta_mod+mul_sta_high+mul_sta_vhigh)`	LONG	sum_mul_sta

STATIC TEXT

E `sum_mul_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ----------------------------------	mul_sta_dtq

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

POPULATION GROWTH RATE

E `sum_mul_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

Maximum growth rate (r_{max})	• No data/information
Von Bertalanffy K	• 0.12 (North Ireland)
Age at maturity (t_m)	• 3 (Atlantic, Gulf of Lion)
Maximum age (t_{max})	• 14 (Northwest Wales) (Tulkani 2017)
Natural mortality (M)	• No data/information
Maximum length (L_{max})	• ~ 50 cm TL (North Sea, Expert information)

(Froese and Pauly 2021)

Low

NUMERIC: INTEGER mul_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum

And 30 other symbols [497]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER mul_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.

And 60 other symbols [498]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER mul_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25

And 88 other symbols [499]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER mul_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25

And 79 other symbols [500]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(mul_pgr_low+mul_pgr_mod+mul_pgr_high+mul_pgr_vhigh)`

LONG sum_mul_pgr

STATIC TEXT

E `sum_mul_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
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Data Quality Score:

NUMERIC: INTEGER mul_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SENSITIVITY TO OTHER STRESSORS

E `sum_mul_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• No data/information

Low I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox And 323 other symbols [501] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_ost_low`
Moderate I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [502] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_ost_mod`
High I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen, And 321 other symbols [503] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_ost_high`
Very high I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda And 315 other symbols [504] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `mul_ost_vhigh`
VARIABLE `(mul_ost_low+mul_ost_mod+mul_ost_high+mul_ost_vhigh)`	LONG `sum_mul_ost`

STATIC TEXT

E `sum_mul_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	mul_ost_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3		

DICKLIPPIGE MEERÄSCHE - THICKLIP GREY MULLET (CHELON LABROSUS)

DIRECTION OF EFFECTS

E `sum_mul_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	mul_doe_pos
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	mul_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	mul_doe_neg
VARIABLE `(mul_doe_pos+mul_doe_neu+mul_doe_neg)`	LONG	sum_mul_doe

STATIC TEXT

E `sum_mul_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT	mul_com

HORNHECHT - GARFISH (BELONE BELONE)

garfish

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Western Baltic Sea and Baltic Proper (Alter and Peck, 2021; Veneranta and Urho 2021)
Stock size	• No data/information
Recruitment	• No data/information
Growth	• No data/information

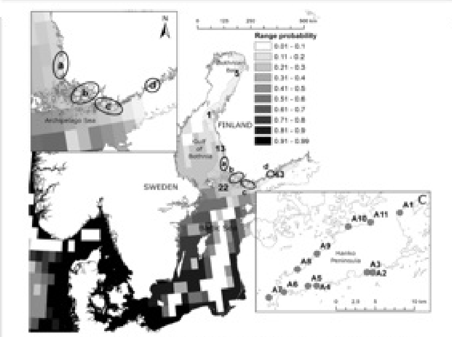


Figure 1. Garfish distribution and larval occurrence in the Baltic Sea. The range probability map is a computer generated native distribution map (Fishbase.org/www.aquamaps version 10/2019). Areas a, b, c and d in SW Finland (inset map) indicate new areas where garfish larvae or juveniles have been reported during the 21st century. In the inset map C are the sampling sites 1-11 where beach seine sampling was conducted in 2005.

(Veneranta and Urho 2021)

HORNHECHT - GARFISH (BELONE BELONE)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Spawning in coastal waters on littoral vegetation (Fonds et al. 1974; Polte and Asmus 2006)
• Shallow seagrass beds Zostera noltii on shallow sandy bottoms are used for spawning (North Sea) (Polte 2004)
• Larvae: habitats along shallow sandy shores where the temperature is higher than in adjacent open water area (Veneranta and Urho 2021)

Low I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul And 124 other symbols [505] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_hab_low _ .
Moderate I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts And 19 other symbols [506] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_hab_mod _ .
High I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [507] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_hab_high _ .

Very high

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [508]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `gar_hab_vhigh`

VARIABLE
`(gar_hab_low+gar_hab_mod+gar_hab_high+gar_hab_vhigh)`

LONG — `sum_gar_hab`

STATIC TEXT

E `sum_gar_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `gar_hab_dtq`

HORNHECHT - GARFISH (BELONE BELONE)

PREY SPECIFICITY

E `sum_gar_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Opportunistic (pelagic nekton) (Alter and Peck 2021; Dorman 1988)*
- *Juveniles (30 mm): cannibalism (Von Westernhagen 1974)*
- *Juvenile (post-larval) garfish feed on copepods and larval bryozoan (Dorman 1988)*
- *Adults: crustaceans, especially crab larvae, and juvenile fish, mostly clupeids (Dorman 1988; 1991)*

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [509]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `gar_prey_low`

Moderate

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [510]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `gar_prey_mod`

High

NUMERIC: INTEGER gar_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i

And 212 other symbols [511]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

-------------------------------------.

Very high

NUMERIC: INTEGER gar_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles

And 104 other symbols [512]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

-------------------------------------.

VARIABLE

`(gar_prey_low+gar_prey_mod+gar_prey_high+gar_prey_vhigh)`

LONG sum_gar_prey

STATIC TEXT

E `sum_gar_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gar_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

-------------------------------------.

HORNHECHT - GARFISH (BELONE BELONE)

ADULT MOBILITY

E `sum_gar_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Highly migratory, congregate in Skagerrak/Kattegat in April/May (Heessen et al. 2015)*
- *Annual migration from overwintering area in the North Sea to the Baltic Proper (Dorman 1991)*

Low

NUMERIC: INTEGER gar_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition

And 2 other symbols [513]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

-------------------------------------.

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habita
And 59 other symbols [514]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gar_mob_mod

High

I Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [515]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gar_mob_high

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gar_mob_vhigh

VARIABLE

`(gar_mob_low+gar_mob_mod+gar_mob_high+gar_mob_vhigh)`

LONG sum_gar_mob

STATIC TEXT

E `sum_gar_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER gar_mob_dtq

HORNHECHT - GARFISH (BELONE BELONE)

DISPERSAL OF EARLY LIFE STAGES

E `sum_gar_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

- *Demersal, adhesive eggs with filaments (Russell 1976)*
- *Planktonic larvae (Froese and Pauly 2021)*
- *Developmental time: 28 days (d) at 15 °C (Alter and Peck 2021)*
- *High abundance of post-larvae and 0-group juveniles in marinas and harbor basins (P. Polte, pers. Obs.)*

Low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [516]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gar_els_low

_ _

Moderate

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [517]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gar_els_mod

_ _

High

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [518]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gar_els_high

_ _

Very high

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [519]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gar_els_vhigh

_ _

VARIABLE

`(gar_els_low+gar_els_mod+gar_els_high+gar_els_vhigh)`

LONG — sum_gar_els

STATIC TEXT

E `sum_gar_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — gar_els_dtq

_ _

HORNHECHT - GARFISH (BELONE BELONE)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_gar_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Demersal eggs with sticky filaments (Russell 1976)*
- *Larvae start feeding immediately (few hours) after hatching (Heessen et al. 2015)*
- *Larvae: habitats along shallow sandy shores where the temperature is higher than in adjacent open water area (Veneranta and Urho 2021)*

Low

NUMERIC: INTEGER gar_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [520]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER gar_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [521]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER gar_ssr_high

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [522]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER gar_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [523]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gar_ssr_low+gar_ssr_mod+gar_ssr_high+gar_ssr_vhigh)`

LONG sum_gar_ssr

STATIC TEXT

E `sum_gar_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gar_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_gar_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

- *Egg deposition in spring in coastal waters (shallow estuaries) (Fonds et al. 1974)*
- *Spawning in May-June (North Sea), larvae hatch in July (Rosenthal and Fonds 1973)*
- *Spawning migration is triggered by temperature (Dorman 1991)*
- *Spawning migrations into southern Baltic Sea in April to May (Dorman 1991)*

Low

NUMERIC: INTEGER — `gar_crs_low`

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `gar_crs_mod`

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `gar_crs_high`

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `gar_crs_vhigh`

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

VARIABLE — LONG — `sum_gar_crs`

`(gar_crs_low+gar_crs_mod+gar_crs_high+gar_crs_vhigh)`

STATIC TEXT

E `sum_gar_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gar_crs_dtq _________________________________.

HORNHECHT - GARFISH (BELONE BELONE)

POPULATION SPAWNING CYCLE

E `sum_gar_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Annual batch spawners
• Spawning in May-June (North Sea) (Rosenthal and Fonds 1973)

Low I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur And 49 other symbols [524] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_spw_low _________________________________.
Moderate I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su And 105 other symbols [525] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_spw_mod _________________________________.
High I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin And 204 other symbols [526] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_spw_high _________________________________.
Very high I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli And 134 other symbols [527] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gar_spw_vhigh _________________________________.
VARIABLE `(gar_spw_low+gar_spw_mod+gar_spw_high+gar_spw_vhigh)`	LONG sum_gar_spw

STATIC TEXT

E `sum_gar_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER gar_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HORNHECHT - GARFISH (BELONE BELONE)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_gar_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Eggs: Optimum temperatures 17-19°C (Fonds et al. 1974)*
- *Max. hatching rate larvae/egg development: 18°C (Von Westernhagen 1974)*
- *At 9°C no viable hatch was observed (Von Westernhagen 1974)*
- *Juveniles (1 to 3 cm standard length) survive at temperatures ranging from 13° to 25°C (Rosenthal and Fonds 1973)*
- *Adults are caught in May and June at temperatures of 15-20 °C (Fonds et al. 1974)*
- *Garfish in the Baltic Sea will benefit from projected increased rates of spring warming but not the concomitant increase in pCO_2 (Alter and Peck 2021)*

Low NUMERIC: INTEGER gar_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [528]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER gar_stt_mod

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [529]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER gar_stt_high

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [530]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER gar_stt_vhigh

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [531]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (gar_stt_low+gar_stt_mod+gar_stt_high+gar_stt_vhigh)	LONG	sum_gar_stt

STATIC TEXT

E `sum_gar_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — gar_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HORNHECHT - GARFISH (BELONE BELONE)

SENSITIVITY TO DECREASING SALINITY

E `sum_gar_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Low salinity can foster uptake of pollutants*
- *Juveniles: Salinity tolerance 7-50 psu (Rosenthal and Fonds 1973)*
- *Adults are found at salinities as low as 7-9 psu (Fonds et al. 1974)*
- *Adults are caught in salinities of 20-30 psu (North Sea) (Fonds et al. 1974)*
- *Max. hatching rate larvae: between 15-33 psu (Von Westernhagen 1974)*
- *Salinity limit (Baltic Sea): 5-6 psu (Veneranta and Urho 2021)*

Low — NUMERIC: INTEGER — gar_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — gar_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne
And 3 other symbols [532]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High	NUMERIC: INTEGER	gar_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [533]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high	NUMERIC: INTEGER	gar_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if
And 28 other symbols [534]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE	LONG	sum_gar_sts
`(gar_sts_low+gar_sts_mod+gar_sts_high+gar_sts_vhigh)`		

STATIC TEXT

E `sum_gar_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	gar_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HORNHECHT - GARFISH (BELONE BELONE)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_gar_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• The proportion of embryos with morphological deformities increased with elevated pCO_2 but not temperature, stable high temperature (17°C) and pCO_2 (1300 µatm, future predictions; 400µatm present value) were lethal for embryos (Alter and Peck 2021)

Low	NUMERIC: INTEGER	gar_sta_low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [535]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER gar_sta_mod

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [536]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER gar_sta_high

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [537]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER gar_sta_vhigh

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [538]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gar_sta_low+gar_sta_mod+gar_sta_high+gar_sta_vhigh)`

LONG sum_gar_sta

STATIC TEXT

E `sum_gar_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gar_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HORNHECHT - GARFISH (BELONE BELONE)

POPULATION GROWTH RATE

E `sum_gar_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

Maximum growth rate (r_{max})	• Prior r= 0.43 (Froese et al. 2017)
Von Bertalanffy K	• 0.1 (unknown area)
Age at maturity (t_m)	• No data/information
Maximum age (t_{max})	• No data/information
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 61.4 cm TL

(www.fishbase.org, (Froese and Pauly 2021)

Low

NUMERIC: INTEGER gar_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [539]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER gar_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [540]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER gar_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [541]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER gar_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [542]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gar_pgr_low+gar_pgr_mod+gar_pgr_high+gar_pgr_vhigh)`

LONG sum_gar_pgr

STATIC TEXT

E `sum_gar_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gar_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HORNHECHT - GARFISH (BELONE BELONE)

SENSITIVITY TO OTHER STRESSORS

E `sum_gar_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Eutrophication, indirect cascade effects

Low

NUMERIC: INTEGER `gar_ost_low`

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [543]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `gar_ost_mod`

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [544]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `gar_ost_high`

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [545]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `gar_ost_vhigh`

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [546]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gar_ost_low+gar_ost_mod+gar_ost_high+gar_ost_vhigh)`

LONG `sum_gar_ost`

STATIC TEXT

E `sum_gar_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER	gar_ost_dtq

HORNHECHT - GARFISH (BELONE BELONE)

DIRECTION OF EFFECTS

E `sum_gar_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	gar_doe_pos
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	gar_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	gar_doe_neg
VARIABLE `(gar_doe_pos+gar_doe_neu+gar_doe_neg)`	LONG	sum_gar_doe

STATIC TEXT

E `sum_gar_doe != 4`

The attribute direction of change must have a sum of 4

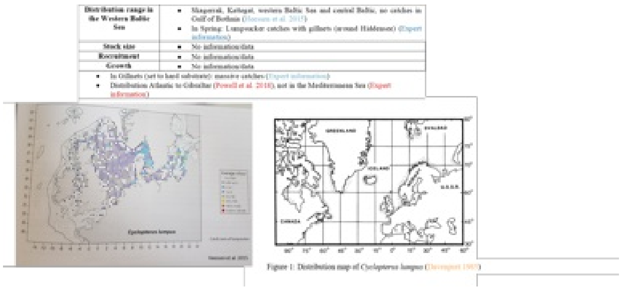
Comments:	TEXT	gar_com

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

`lumpsucker`

STATIC TEXT

Additional Information:



Distribution range in the Western Baltic Sea	• Skagerrak, Kattegat, western Baltic Sea and central Baltic, no catches in Gulf of Bothnia (Heessen et al. 2015) • In Spring: Lumpsucker catches with gillnets (around [illegible]) (Expert information)
Stock size	• No information/data
Recruitment	• No information/data
Growth	• No information/data

• In Gillnets (set to hard substrate): massive catches (Expert information)
• Distribution Atlantic to Gibraltar (Powell et al. 2018), not in the Mediterranean Sea (Expert information)

Figure 1: Distribution map of Cyclopterus lumpus (Davenport 1985)

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Oceanodromous (www.fishbase.org, Froese and Pauly 2021)
• Benthopelagic, solitary, pelagic, living in the upper 50-60 m in oceanic water on rocky bottoms, also occur on floating seaweed (Davenport 1985)
• Juveniles: Seaweed beds are important habitats, living and feeding on and around weed beds (Vandendriessche et al. 2007)
• Adults remained pelagic until winter before spring spawning, demersal habit occurred during that winter (Bagge 1964; Schopka 1974)
• Structured hard spawning habitats along Wismar and Kiel (Expert information)
• Observations of juveniles in early spring (Feb.), on stones at the lighthouse of Bülk (Kiel) (Western Baltic Sea) (Expert information)
• During breeding season, males establish territories in shallow water on rocky and/or sea-weed-covered substrate (Powell et al. 2018)
• Spawning areas are located near shore shallow water (Davenport 1985)
• Occurrence water depth in 10-80 m (Baltic Sea), 0-55 m (North Sea) (Heessen et al. 2015)

Low

NUMERIC: INTEGER `lum_hab_low`

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [547]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `lum_hab_mod`

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [548]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `lum_hab_high`

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [549]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [550]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_hab_vhigh`

VARIABLE
`(lum_hab_low+lum_hab_mod+lum_hab_high+lum_hab_vhigh)`

LONG `sum_lum_hab`

STATIC TEXT

E `sum_lum_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER `lum_hab_dtq`

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

PREY SPECIFICITY

E `sum_lum_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Prey mainly on large planktonic organisms living in surface/mid water, but also benthic organisms, particularly those dwelling upon weed (Davenport 1985; Powell et al. 2018)
• Juveniles: motile crustaceans larger than 0.5 mm (prey items associated on seaweed) (Ingólfsson and Kristjánsson 2002)
• Adults: Small crustaceans (mysids, amphipods, euphausids, isopods, decapod zoeae), ctenophores, polychaetes worms, seagrass, insects, small fish, fish eggs (Davenport 1985; Powell et al. 2018)
• Feeding behavior in aquarium: Opportunistic (Expert information)
• Specialized on food, but not limited (Expert information)
• Prey on fish lice - Branchiura in Norway (Expert information)

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
And 164 other symbols [551]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_prey_low`

Moderate

NUMERIC: INTEGER `lum_prey_mod`

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
[And 184 other symbols [552]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `lum_prey_high`

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
[And 212 other symbols [553]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `lum_prey_vhigh`

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
[And 104 other symbols [554]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(lum_prey_low+lum_prey_mod+lum_prey_high+lum_prey_vhigh)`

LONG `sum_lum_prey`

STATIC TEXT

E `sum_lum_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER `lum_prey_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

ADULT MOBILITY

E `sum_lum_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Extensive annual migrations between feeding grounds (deeper waters in winter) and the shallower waters preferred for spawning in spring and summer (Davenport 1985; Kasper et al. 2014)

Low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
[And 2 other symbols [555]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_mob_low`

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
[And 59 other symbols [556]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_mob_mod`

High

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
[And 122 other symbols [557]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_mob_high`

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_mob_vhigh`

VARIABLE
`(lum_mob_low+lum_mob_mod+lum_mob_high+lum_mob_vhigh)`

LONG `sum_lum_mob`

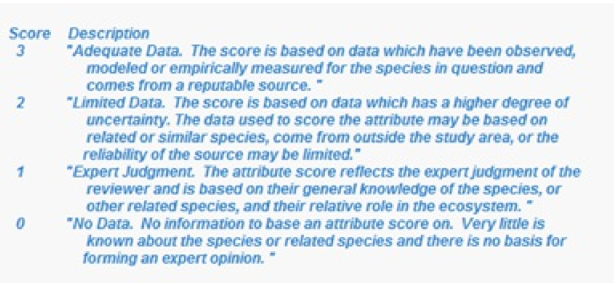
STATIC TEXT

E `sum_lum_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER `lum_mob_dtq`

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_lum_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Demersal eggs: Females releasing eggs freely into the water on to the surface of a nest, in contact with sea water, eggs adhere to one another to form large ovoid masses (Powell et al. 2018)
• Hatching after 31 days at 6.4 °C, 25 days at 9.8 °C (Atlantic) (Collins 1978)
• Pelagic larvae are dispersed by water currents, early hatched larvae remain in shallow water, often attached to weed (Davenport 1985)
• Older juveniles adopt semipelagic habit of adults (Davenport 1985)

Low

NUMERIC: INTEGER `lum_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [558]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `lum_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [559]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `lum_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [560]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `lum_els_vhigh`

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [561]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(lum_els_low+lum_els_mod+lum_els_high+lum_els_vhigh)`

LONG `sum_lum_els`

STATIC TEXT

E `sum_lum_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — lum_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_lum_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Spawning season Jan-May, adults move inshore to spawn on rocky grounds (Heessen et al. 2015)
• Larvae and juveniles are known to spend the first few months in tidal pools before migrating out into open water, but yolk sac larvae and juveniles <30 mm are also found associated with floating seaweed clumps between 10 and 30 km from land (Ingólfsson 2000; Moring 2001)
• Hatchlings and juveniles appear to be almost obligate inhabitants of seaweed, living and feeding on and around weed beds (Vandendriessche et al. 2007), although young juveniles are also commonly found in parts of the intertidal zone, such as rockpools (Moring 2001)
• Hatchlings tend to consume harpacticoid copepods or halacrid mites (Arachnida) (Ingólfsson and Kristjánsson 2002)
• Juvenile lumpfish (c. 5–55 mm length) are apparently year-round seaweed specialists, inhabiting and feeding on surface plankton after hatching and weed-associated invertebrate fauna when larger (Powell et al. 2018; Vandendriessche et al. 2007)

Low

NUMERIC: INTEGER — lum_ssr_low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [562]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — lum_ssr_mod

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [563]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — lum_ssr_high

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [564]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — lum_ssr_vhigh

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [565]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(lum_ssr_low+lum_ssr_mod+lum_ssr_high+lum_ssr_vhigh)`

LONG — sum_lum_ssr

STATIC TEXT

E `sum_lum_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER lum_ssr_dtq
V1 `self.InRange(0,3) || self == null`	_______________________________
M1 Value must be between 0 and 3	

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_lum_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Assumed to spawn at age 5-6 (citation in Davenport 1985)
• Early in the breeding season, males establish territories in shallow water on rocky and/or sea-weed-covered substrate, prior to the arrival of females; females arrive asynchronously, allowing more than one pairing and breeding event to occur per animal (Powell et al. 2018)
• Intensive parental care by males (fanning behaviour to promote oxygen uptake by egg masses, males have been observed to spout water from the mouth during low tide; protection against predators), males guard eggs for 6-10 weeks (Davenport 1983; Davenport 1985)
• Semi-pelagic status of adult females (Powell et al. 2018)
• Homing behaviour (Davenport 1985; Powell et al. 2018)
• Females do not release all their eggs in one batch, interval spawning of 8-14 days (citations in Davenport 1985)

Low	NUMERIC: INTEGER lum_crs_low
I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.	_______________________________
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

Moderate	NUMERIC: INTEGER lum_crs_mod
I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.	_______________________________
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

High	NUMERIC: INTEGER lum_crs_high
I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.	_______________________________
V1 `self.InRange(0,5) || self == null`	
M1 Value must be between 0 and 5	

Very high

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_crs_vhigh`

VARIABLE

`(lum_crs_low+lum_crs_mod+lum_crs_high+lum_crs_vhigh)`

LONG `sum_lum_crs`

STATIC TEXT

E `sum_lum_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER `lum_crs_dtq`

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

POPULATION SPAWNING CYCLE

E `sum_lum_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Spawning in spring and summer (Davenport 1985; Kasper et al. 2014)*
- *Spawning season Jan-May (North Sea and Baltic Sea) (Heessen et al, 2015)*
- *Females do not release all their eggs in one batch, interval spawning of 8-14 days (citations in Davenport 1985)*
- *Spawning duration ~ 6 weeks in spring (around Poel island) (Expert information)*

Low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur

And 49 other symbols [566]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_spw_low`

Moderate

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su

And 105 other symbols [567]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER `lum_spw_mod`

High I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin And 204 other symbols [568] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ______________________________________	`lum_spw_high`
Very high I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli And 134 other symbols [569] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ______________________________________	`lum_spw_vhigh`
VARIABLE `(lum_spw_low+lum_spw_mod+lum_spw_high+lum_spw_vhigh)`	LONG	`sum_lum_spw`

STATIC TEXT

E `sum_lum_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ______________________________________	`lum_spw_dtq`

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_lum_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Lumpsucker is eurythermal but capable of inhabiting very cold water (Davenport 1985; Powell et al. 2018)*
- *Arctic-temperate distribution (Expert information)*
- *Climate change looser: Lumpsucker will not benefit from warming (Expert information)*

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [570] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ______________________________________	`lum_stt_low`

Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [571] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `lum_stt_mod` ------------------------------------
High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [572] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `lum_stt_high` ------------------------------------
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [573] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `lum_stt_vhigh` ------------------------------------
VARIABLE `(lum_stt_low+lum_stt_mod+lum_stt_high+lum_stt_vhigh)`	LONG `sum_lum_stt`

STATIC TEXT

E `sum_lum_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `lum_stt_dtq` ------------------------------------

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_lum_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Baltic Sea population live in low salinity areas, physiologically adapted to lower salinities (Davenport 1985)*
- *Salinity tolerance: Reproduction at 6-8 psu (Expert information)*
- *Norway/Atlantic: Egg development was normal between 20-34 psu, death occurred at lower or higher salinities (Davenport 1985)*

Low	NUMERIC: INTEGER	lum_sts_low
I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

Moderate	NUMERIC: INTEGER	lum_sts_mod
I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne And 3 other symbols [574] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

High	NUMERIC: INTEGER	lum_sts_high
I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [575] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

Very high	NUMERIC: INTEGER	lum_sts_vhigh
I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if And 28 other symbols [576] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

VARIABLE	LONG	sum_lum_sts
`(lum_sts_low+lum_sts_mod+lum_sts_high+lum_sts_vhigh)`		

STATIC TEXT

E `sum_lum_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	lum_sts_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	________________________________	

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_lum_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [577]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `lum_sta_low`

Moderate

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [578]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `lum_sta_mod`

High

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [579]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `lum_sta_high`

Very high

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [580]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `lum_sta_vhigh`

VARIABLE

`(lum_sta_low+lum_sta_mod+lum_sta_high+lum_sta_vhigh)`

LONG — `sum_lum_sta`

STATIC TEXT

E `sum_lum_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `lum_sta_dtq`

POPULATION GROWTH RATE

E `sum_lum_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (www.fishbase.org, Froese and Pauly 2021)

Maximum growth rate (r_{max})	• Prior r= 0.17 (Froese et al. 2017)
Von Bertalanffy K	• 0.25 (Atlantic) (Kasper et al. 2014)
Age at maturity (t_m)	• 3-4 (North Sea, Atlantic)
Maximum age (t_{max})	• 6 (Baltic Sea)
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 52.7 cm TL (Kasper et al. 2014)

Low I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum And 30 other symbols [581] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _________________________________	`lum_pgr_low`
Moderate I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0. And 60 other symbols [582] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _________________________________	`lum_pgr_mod`
High I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 And 88 other symbols [583] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _________________________________	`lum_pgr_high`
Very high I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 And 79 other symbols [584] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _________________________________	`lum_pgr_vhigh`
VARIABLE `(lum_pgr_low+lum_pgr_mod+lum_pgr_high+lum_pgr_vhigh)`	LONG	`sum_lum_pgr`

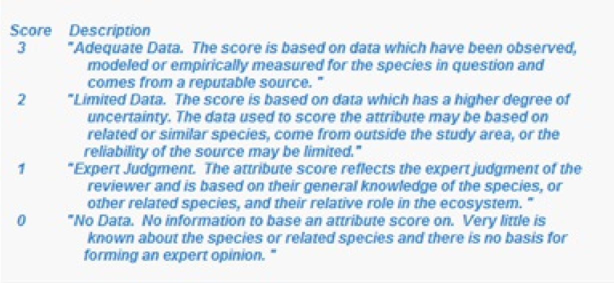
STATIC TEXT

E `sum_lum_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
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1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER `lum_pgr_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_lum_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• *Emerging diseases by parasites, such as Nucleospora cyclopteri were more prevalent in females around Iceland (Freeman et al. 2013)*
• *Sensitivity to oxygen depletion increased during development, 36 day old eggs could extract oxygen from water of only 10-20% air saturation (Davenport 1985)*
• *Early stage eggs are tolerant of hypoxic conditions and can even survive brief exposure to anoxic sea water, later eggs and larvae are much more susceptible to oxygen lack (Davenport 1983)*
• *Fishery targeting gravid females will bias sex ratio (Powell et al. 2018)*
• *Degradation of habitats: Will benefit from wind farms: Potential new habitats? (Expert information)*

Low NUMERIC: INTEGER `lum_ost_low`

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [585]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER `lum_ost_mod`

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [586]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER `lum_ost_high`

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [587]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER `lum_ost_vhigh`

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [588]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (lum_ost_low+lum_ost_mod+lum_ost_high+lum_ost_vhigh)	LONG	sum_lum_ost

STATIC TEXT

E sum_lum_ost != 5

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	lum_ost_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

SEEHASE - LUMPSUCKER (CYCLOPTERUS LUMPUS)

DIRECTION OF EFFECTS

E sum_lum_pgr == 5

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive	NUMERIC: INTEGER	lum_doe_pos

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

Neutral	NUMERIC: INTEGER	lum_doe_neu

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

Negative	NUMERIC: INTEGER	lum_doe_neg

V1 self.InRange(0,4) || self == null

M1 Value must be between 0 and 4

VARIABLE (lum_doe_pos+lum_doe_neu+lum_doe_neg)	LONG	sum_lum_doe

STATIC TEXT

E sum_lum_doe != 4

The attribute direction of change must have a sum of 4

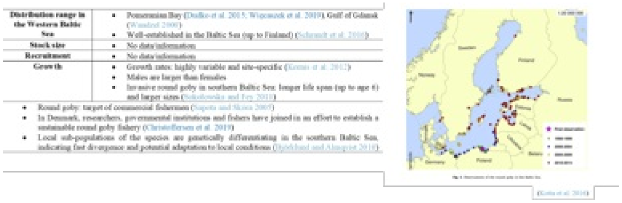
Comments:	TEXT	lum_com

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

goby

STATIC TEXT

Additional Information:



Distribution range in the Western Baltic Sea	• Pomeranian Bay, Gulf of Gdansk • Well-established in the Baltic Sea (up to Finland)
Stock size	• No data/information
Recruitment	• No data/information
Growth	• Growth rates: highly variable and site-specific (Kornis et al. 2012) • Males are larger than females • Invasive round goby in southern Baltic Sea: longer life span (up to age 6) and larger sizes

• Round goby: target of commercial fishermen
• In Denmark, researchers, governmental institutions and fishers have joined in an effort to establish a sustainable round goby fishery
• Local sub-populations of the species are genetically differentiating in the southern Baltic Sea, indicating fast divergence and potential adaptation to local conditions

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Rapidly adapts to new habitats (Kornis et al. 2012)
• Hard substrates, rocky habitats preferred, however, sandy and muddy are also utilized (Kornis et al. 2012)
• Juveniles (small) inhabit shallower, densely vegetated habitats (Henseler et al. 2020)
• Abundance may correlate with depth and density of aquatic vegetation (Kornis et al. 2012)
• Younger gobies are more abundant in the frontal areas of underwater concrete structures where the substrate is characterized by loose stones and the presence of Mya arenaria (Skora and Rzeznik 2001)
• Adult round goby prefers an environment full of hiding places that also can be used for nests, submerged stones or concrete structures covered with colonies of M. trossulus are its preferred habitat (Skora and Rzeznik 2001)
• round goby spend autumn and winter at significantly deeper and offshore areas compared to spring and summer months; few fish were captured at depths < 25 m in these colder months (Behrens et al. 2021)
• In spring and summer, round goby were not captured at depths > 25 m (Behrens et al. 2021)

Low

NUMERIC: INTEGER — gob_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [589]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — gob_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [590]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — gob_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [591]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
[And 164 other symbols [592]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `gob_hab_vhigh`

VARIABLE
`(gob_hab_low+gob_hab_mod+gob_hab_high+gob_hab_vhigh)`

LONG — `sum_gob_hab`

STATIC TEXT

E `sum_gob_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `gob_hab_dtq`

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

PREY SPECIFICITY

E `sum_gob_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Opportunistic: Capacity to adapt to locally abundant food sources (Kornis et al. 2012; Nurkse et al. 2016)
• Invertebrates, mollusks and crustaceans (Maitland and Linsell 2007; Wandzel 2000)
• Consumption of small (< 38mm TL) flounder (Schrandt et al. 2016)
• Round gobies preferred C. crangon. M. edulis was preferred over herring eggs when C. crangon was absent, smaller gobies (< 10 cm) feed on herring eggs (Wiegleb et al. 2018)
• Western Baltic: Wide range of different resident organisms (such as Nereidae, Gammaridae, Isopoda, Decapoda, Balanidae and Mollusca) (Oesterwind et al. 2017)
• High interannual variability in the prey species, crustaceans had the highest importance in the diet of all examined size classes of round goby (Hempel et al. 2019)
• Round goby in the Western Baltic do mainly prey on either barnacles or mollusks (Matern et al. 2021)

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
[And 164 other symbols [593]]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `gob_prey_low`

Moderate

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
[And 184 other symbols [594]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gob_prey_mod

High

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
[And 212 other symbols [595]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gob_prey_high

Very high

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
[And 104 other symbols [596]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — gob_prey_vhigh

VARIABLE

`(gob_prey_low+gob_prey_mod+gob_prey_high+gob_prey_vhigh)`

LONG — sum_gob_prey

STATIC TEXT

E `sum_gob_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — gob_prey_dtq

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

ADULT MOBILITY

E `sum_gob_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Territorial with limited swimming range (Kotta et al. 2016; Ray and Corkum 2001), high site affinity*
- *Seasonal migrations are common, seaward return migration during winter, riverine upstream dispersal (Christoffersen et al. 2019)*

Low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [597]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_mob_low

____

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [598]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_mob_mod

____

High

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [599]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_mob_high

____

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_mob_vhigh

____

VARIABLE

`(gob_mob_low+gob_mob_mod+gob_mob_high+gob_mob_vhigh)`

LONG sum_gob_mob

STATIC TEXT

E `sum_gob_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER gob_mob_dtq

____

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_gob_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Dispersal of larvae (nocturnally pelagic) via ballast water (Kornis et al. 2012; Kotta et al. 2016)

Low I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita And 39 other symbols [600] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_els_low
Moderate I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot And 56 other symbols [601] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_els_mod
High I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne And 47 other symbols [602] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_els_high
Very high I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni And 93 other symbols [603] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_els_vhigh
VARIABLE `(gob_els_low+gob_els_mod+gob_els_high+gob_els_vhigh)`	LONG sum_gob_els

STATIC TEXT

E `sum_gob_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gob_els_dtq

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_gob_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• *Eggs and larvae are large (3.2 mm diameter), hatch at ~ 5 mm TL (Kornis et al. 2012)*
• *larvae feed on zooplankton (citations in Kornis et al. 2012)*

Low

NUMERIC: INTEGER — `gob_ssr_low`

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [604]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `gob_ssr_mod`

I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r
And 365 other symbols [605]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `gob_ssr_high`

I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc
And 310 other symbols [606]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `gob_ssr_vhigh`

I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi
And 236 other symbols [607]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gob_ssr_low+gob_ssr_mod+gob_ssr_high+gob_ssr_vhigh)`

LONG — `sum_gob_ssr`

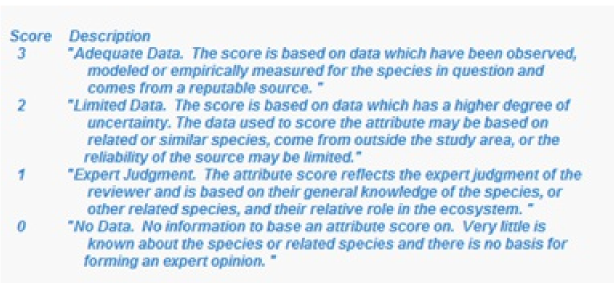
STATIC TEXT

E `sum_gob_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gob_ssr_dtq ________________________________

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_gob_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Early maturity (Baltic Sea), individuals begin to reproduce at different times (Wandzel 2000)
• batch spawner, which means that females do not spawn all their eggs at one time, but release them in portions throughout the reproductive season (Tomczak and Sapota 2006)
• Repeated spawning throughout summer (Charlebois et al. 2001)
• Parental care by males (Charlebois et al. 2001)
• fish have specific reproductive behaviours including repetitive spawning from spring to autumn, the establishment of territory, nest preparation and aggressive behaviour (Corkum et al. 1998; MacInnis and Corkum 2000)
• Males are cavity spawners, defending territory and guard embryos and newly hatched larvae (Corkum et al. 1998; MacInnis and Corkum 2000)
• April-Sept in Puck Bay (Baltic Sea) (Wandzel 2000)
• In the Baltic Sea, the round goby spawns in waters at temperatures of 17-18°C and with salinity of 8- 9 psu (Tomczak and Sapota 2006)

Low I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_crs_low ________________________________
Moderate I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_crs_mod ________________________________
High I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_crs_high ________________________________
Very high I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_crs_vhigh ________________________________
VARIABLE `(gob_crs_low+gob_crs_mod+gob_crs_high+gob_crs_vhigh)`	LONG sum_gob_crs

STATIC TEXT

E `sum_gob_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gob_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

POPULATION SPAWNING CYCLE

E `sum_gob_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• April-Sept in Puck Bay (Baltic Sea) (Wandzel 2000)
• Spawning activity intensified from March to May and then from June to August or even September (Baltic Sea) (Tomczak and Sapota 2006)
• Spawning cycle is repeated five to six times throughout the year at intervals of approx. 17-28 days, length of interval between subsequent batches depends on water temperature, higher temperatures mean that intervals are shorter (Charlebois et al. 1997 and citations in Tomczak and Sapota 2006)

Low

NUMERIC: INTEGER gob_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [608]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER gob_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [609]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER gob_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [610]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [611]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_spw_vhigh

VARIABLE

`(gob_spw_low+gob_spw_mod+gob_spw_high+gob_spw_vhigh)`

LONG sum_gob_spw

STATIC TEXT

E `sum_gob_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER gob_spw_dtq

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_gob_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Increase expansion, when temperatures close to its energetic optimum of 26°C (Kornis et al. 2012)*
- *Spawning at 9-26°C (Kornis et al. 2012)*
- *Wide thermal tolerance: -1 to 30°C (citation in Kornis et al. 2012)*
- *Physiological performance unperturbed from 15-28°C (Christensen et al. 2021)*

Low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [612]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_stt_low

Moderate

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [613]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_stt_mod

High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te [And 400 other symbols [614]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_stt_high
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp [And 341 other symbols [615]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_stt_vhigh
VARIABLE `(gob_stt_low+gob_stt_mod+gob_stt_high+gob_stt_vhigh)`	LONG sum_gob_stt

STATIC TEXT

E `sum_gob_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gob_stt_dtq

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_gob_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Native distribution of the round goby is located in the area of the Black Sea with a mean salinity of 19, the Caspian Sea with a mean salinity of 12.8 (Charlebois et al. 1997)*
- *Smaller and slow growing fish in freshwater (Kornis et al. 2012)*
- *Freshwater: high stress level, however round goby inhabit freshwater habitats (Puntila-Dodd et al. 2021)*
- *Salinity tolerance <30 psu (Kornis et al. 2012)*
- *Fish growth was low at salinity of 30 psu (Hempel and Thiel 2015)*

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_sts_low -
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [616] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_sts_mod -
High I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [617] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_sts_high -
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [618] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER gob_sts_vhigh -
VARIABLE `(gob_sts_low+gob_sts_mod+gob_sts_high+gob_sts_vhigh)`	LONG sum_gob_sts

STATIC TEXT

E `sum_gob_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gob_sts_dtq -

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_gob_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [619]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_sta_low

Moderate

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [620]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_sta_mod

High

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [621]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_sta_high

Very high

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [622]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER gob_sta_vhigh

VARIABLE

`(gob_sta_low+gob_sta_mod+gob_sta_high+gob_sta_vhigh)`

LONG sum_gob_sta

STATIC TEXT

E `sum_gob_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER gob_sta_dtq

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

POPULATION GROWTH RATE

E `sum_gob_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

Maximum growth rate (r_{max})	• No data/information
Von Bertalanffy K	• 0.5 (unknown area)
Age at maturity (t_m)	• No data/information
Maximum age (t_{max})	• 6 (Baltic Sea)
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 15.4 cm TL

(Froese and Pauly 2021)

Low

NUMERIC: INTEGER — gob_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [623]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — gob_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [624]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — gob_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [625]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — gob_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [626]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_gob_pgr

`(gob_pgr_low+gob_pgr_mod+gob_pgr_high+gob_pgr_vhigh)`

STATIC TEXT

E `sum_gob_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER gob_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_gob_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• *Tolerance of very low oxygen levels, lethal thresholds: 0.4-1.3 mg/L (Charlebois et al. 1997)*

Low

NUMERIC: INTEGER gob_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [627]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER gob_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [628]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER gob_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [629]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER gob_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [630]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(gob_ost_low+gob_ost_mod+gob_ost_high+gob_ost_vhigh)`

LONG sum_gob_ost

STATIC TEXT

E `sum_gob_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER gob_ost_dtq ________________________________

SCHWARZMUNDGRUNDEL - ROUND GOBY (NEOGOBIUS MELANOSTOMUS)

DIRECTION OF EFFECTS

E `sum_gob_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER gob_doe_pos ________________________________
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER gob_doe_neu ________________________________
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER gob_doe_neg ________________________________
VARIABLE (gob_doe_pos+gob_doe_neu+gob_doe_neg)	LONG sum_gob_doe

STATIC TEXT

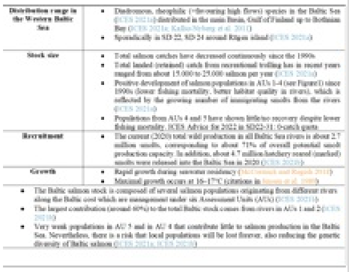
E `sum_gob_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT gob_com ....

STATIC TEXT

Additional Information:



Distribution range in the Western Baltic Sea	• Diadromous, rheophilic (=favouring high flows) species in the Baltic Sea (ICES 2021a) distributed in the main Basin, Gulf of Finland up to Bothnian Bay (ICES 2021a; Kallio-Nyberg et al. 2011) • Sporadically in SD 22, SD 24 around Rügen island (ICES 2021a)
Stock size	• Total salmon catches have decreased continuously since the 1990s • Total landed (retained) catch from recreational trolling has in recent years ranged from about 15.000 to 25.000 salmon per year (ICES 2021a) • Positive development of salmon populations in AUs 1-4 (see Figure 1) since 1990s (lower fishing mortality, better habitat quality in rivers), which is reflected by the growing number of immigrating smolts from the rivers (ICES 2021a) • Populations from AUs 4 and 5 have shown little/no recovery despite lower fishing mortality. ICES Advice for 2022 in SD22-31: 0-catch quota
Recruitment	• The current (2020) total wild production in all Baltic Sea rivers is about 2.7 million smolts, corresponding to about 71% of overall potential smolt production capacity. In addition, about 4.7 million hatchery reared (marked) smolts were released into the Baltic Sea in 2020 (ICES 2021b)
Growth	• Rapid growth during seawater residency (McCormick and Regish 2018) • Maximal growth occurs at 16–17°C (citations in Jansen et al. 2008)

• The Baltic salmon stock is composed of several salmon populations originating from different rivers along the Baltic cost which are management under six Assessment Units (AUs) (ICES 2021b)
• The largest contribution (around 60%) to the total Baltic stock comes from rivers in AUs 1 and 2 (ICES 2021b)
• Very weak populations in AU 5 and in AU 4 that contribute little to salmon production in the Baltic Sea. Nevertheless, there is a risk that local populations will be lost forever, also reducing the genetic diversity of Baltic salmon (ICES 2021a; ICES 2021b)

Salmon in subdivisions 22–31 (Main Basin and Gulf of Bothnia). Grouping of salmon stocks in six assessment units (AUs) in the Baltic Sea, including the Gulf of Finland. The genetic variability between stocks of an AU is smaller than the genetic variability between stocks of different AUs. In addition, the stocks of a particular unit exhibit similar migration patterns. Wild salmon rivers (dark blue), mixed salmon rivers (light blue), reared salmon rivers (red), river stretches not accessible for salmon (grey).

(ICES 2021b)

STATIC TEXT

Figure 1. Freshwater distribution of Baltic salmon in recent (dark shading) and historical times (light shading).

(McKinnell 1997)

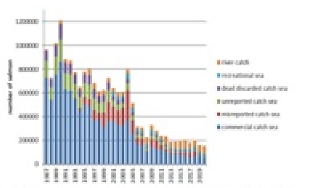


Figure 1 Salmon in subdivisions 22–31 (Main Basin and Gulf of Bothnia). Total number of removals (dead catch) in the years 1987–2020: river catches (mainly recreational, but also including some commercial fishing) and removals at sea (split into commercial and recreational nominal landings, unreported and misreported commercial landings, and dead discards). Note that commercial sea-catch also includes recreational sea catch in the years 1987–2000.

(ICES 2021b)

STATIC TEXT

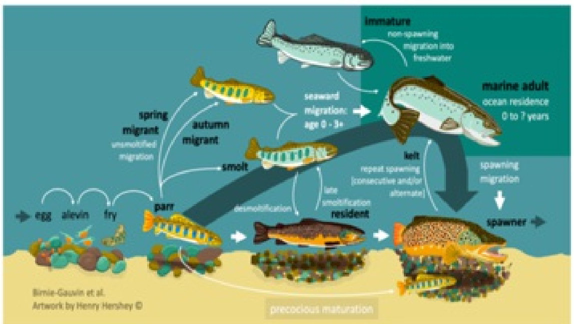


Fig. 4 An improved lifecycle. Fish begin as eggs, and hatch into alevins; they start feeding as fry, and shortly thereafter become parr. From the parr stage, individuals have five options: (1) to migrate in the autumn (likely unsmoltified, but this remains unclear), (2) smoltify and migrate in the spring, (3) migrate in the spring as an unsmoltified parr-like individual, (4) mature and become a precocious parr (with or without subsequent seaward migration), or (5) assume residency (no maturation in first year). In assuming residency, individuals remain in freshwater, mature, and spawn with other residents as well as their anadromous counterparts. Individuals are however flexible in that they may undergo late smoltification and migrate. Migrating smolts are also flexible as they may desmoltify and assume residency. Sea-migrating individuals typically migrate between the age of 0 and 3. After a short or long (highly variable, hence the question mark) amount of time at sea, marine adults migrate to freshwater to spawn; some of these may be immature. Kelts (post-spawned) and immature individuals migrate back to the marine environment. The spawning cycle can be repeated. Freshwater stages are highlighted by a light blue background; marine stages are highlighted by a dark blue background. The most commonly described anadromous lifecycle (and perhaps the most commonly observed strategy) is highlighted by the dark blue arrow. Scientific input: Kim Birnie-Gauvin, Eva B. Thorstad and Kim Aarestrup. Artwork: Henry Hershey

(Birnie-Gauvin et al. 2019)

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Freshwater: Free- and fast flowing rivers and streams connected to the sea, gravel banks in a pool-riffle sequence for spawning, starting life in freshwater (Heessen et al. 2015)
• Juveniles remain in freshwater for 1-6 years, migrating to coastal marine waters, where they remain 1-4 years, then returning to freshwater for spawning (Froese and Pauly 2021; Hutchings and Jones 1998)
• Sea: Post-smolts avoid cold deeper water, swim in surface layer (Jutila and Toivonen 1985)
• In the Western Baltic Sea most abundant in 5-10 m (Heessen et al. 2015)

Low

NUMERIC: INTEGER — sal_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
And 124 other symbols [631]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — sal_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
And 19 other symbols [632]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — sal_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [633]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — sal_hab_vhigh

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
And 164 other symbols [634]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sal_hab_low+sal_hab_mod+sal_hab_high+sal_hab_vhigh)`

LONG — sum_sal_hab

STATIC TEXT

E `sum_sal_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — sal_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

PREY SPECIFICITY

E `sum_sal_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Juveniles: Invertebrates, adult piscivorous (Maitland and Linsell 2007)*
- *Post-smolts (16-18 cm) eating various instect species of terrestrial origin in the first month at sea (Jutila andToivonen, 1985), diet shifts at about 16-25 cm from invertebrates to fish (e.g., sticklebacks, smelt) (Jutila and Toivonen 1985; Salminen et al. 1994)*
- *Preying on herring (Kallio-Nyberg et al. 2011; Salminen et al. 2001)*

Low I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, And 164 other symbols [635] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _ .	`sal_prey_low`
Moderate I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of And 184 other symbols [636] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _ .	`sal_prey_mod`
High I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i And 212 other symbols [637] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _ .	`sal_prey_high`
Very high I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles And 104 other symbols [638] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER _ .	`sal_prey_vhigh`
VARIABLE `(sal_prey_low+sal_prey_mod+sal_prey_high+sal_prey_vhigh)`	LONG	`sum_sal_prey`

STATIC TEXT

E `sum_sal_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

`sal_prey_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

ADULT MOBILITY

E `sum_sal_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Highly migratory during marine phase (Heessen et al. 2015)*
- *Smolts: Small smolts (total length 17.0 cm) were more frequently caught farther from the release site than were those released as larger smolts (>17 cm), the abundance of suitable prey (age 0+ herring) in the year of smolt release was found to be a key factor influencing the migration distance (Kallio-Nyberg et al. 1999)*
- *The salmon released in the years of strong herring recruitment in the Gulf of Bothnia had a higher probability to stay in the Bothnian Sea for feeding and not to migrate farther south (Kallio-Nyberg et al. 1999)*
- *Precise homing (Stabell 1984)*

Low

NUMERIC: INTEGER

`sal_mob_low`

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition

And 2 other symbols [639]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

`sal_mob_mod`

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita

And 59 other symbols [640]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

`sal_mob_high`

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity

And 122 other symbols [641]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER

`sal_mob_vhigh`

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

(sal_mob_low+sal_mob_mod+sal_mob_high+sal_mob_vhigh)

LONG sum_sal_mob

STATIC TEXT

E sum_sal_mob != 5

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER sal_mob_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

DISPERSAL OF EARLY LIFE STAGES

E sum_sal_mob == 5

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Larvae stay in the interstitial until yolk sac is absorbed, then emerge from the gravel and drift into shallower water areas where they spend juvenile phase and change to exogenous feeding (Bardonnet et al. 1993; McCormick et al. 1998)
• Salmon fry are mobile and move also upstream (Eisenhauer et al. 2021)

Low

NUMERIC: INTEGER sal_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita

And 39 other symbols [642]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sal_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot

And 56 other symbols [643]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sal_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne

And 47 other symbols [644]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [645]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER sal_els_vhigh

VARIABLE
`(sal_els_low+sal_els_mod+sal_els_high+sal_els_vhigh)`

LONG sum_sal_els

STATIC TEXT

E `sum_sal_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER sal_els_dtq

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_sal_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Parr (i.e. juveniles) may remain in freshwater environments for 1-7 years (depending on temperature and feeding conditions) but most stay for 2-3 years (www.fishbase.org, Froese and Pauly 2021)
• Juveniles spend 1-5 years in the river before migrating seawards (Forseth et al. 2017)
• Parr undergo morphological and physiological changes called smoltification which prepares them for life in the sea (Froese and Pauly 2021)
• Seaward migration starting in spring, spending 1-4 years in the ocean, in Baltic Sea they stay in Baltic Sea (Karlson and Karlström 1994)
• Smolts migrate to sea at approx. 8°C (Hvidsten et al. 1998)
• Juvenile period in stream, smoltification, feeding migration to sea and return to natal streams for spawning (Kallio-Nyberg et al. 2006)

Low

I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s
And 245 other symbols [646]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER sal_ssr_low

Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r [And 365 other symbols [647]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	sal_ssr_mod
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc [And 310 other symbols [648]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	sal_ssr_high
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi [And 236 other symbols [649]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	sal_ssr_vhigh
VARIABLE `(sal_ssr_low+sal_ssr_mod+sal_ssr_high+sal_ssr_vhigh)`	LONG	sum_sal_ssr

STATIC TEXT

E `sum_sal_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ________________________________	sal_ssr_dtq

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_sal_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• *Iteroparous (Froese and Pauly 2021)*
• *Anadromous: return from ocean to natal rivers (Stabell 1984)*
• *They can undertake extensive spawning migrations, which can exceed 100 km, or occasionally even >500 km, the same as recorded for sea trout) (Klemetsen et al. 2003)*
• *At the transition to shallow overflowing gravel riffle stretches, the females cut spawning redds into the riverbed (References cited in Smialek et al. 2021)*
• *Fertilized eggs sink into the redd, covered with a layer of gravel (by male) (Froese and Pauly 2021; Kottelat and Freyhof 2007)*
• *Juveniles spend 1-5 years in the river before migrating seawards (Forseth et al. 2017)*

Low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

NUMERIC: INTEGER — `sal_crs_low`

Moderate

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

NUMERIC: INTEGER — `sal_crs_mod`

High

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

NUMERIC: INTEGER — `sal_crs_high`

Very high

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

NUMERIC: INTEGER — `sal_crs_vhigh`

VARIABLE
`(sal_crs_low+sal_crs_mod+sal_crs_high+sal_crs_vhigh)`

LONG — `sum_sal_crs`

STATIC TEXT

E `sum_sal_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`
M1 Value must be between 0 and 3

NUMERIC: INTEGER — `sal_crs_dtq`

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

POPULATION SPAWNING CYCLE

E `sum_sal_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• In European latitudes: Spawning between November-January, local spawning events extend over two-three weeks (Armstrong et al. 2003; Crisp 1993)

Low

NUMERIC: INTEGER `sal_spw_low`

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [650]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `sal_spw_mod`

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [651]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `sal_spw_high`

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [652]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `sal_spw_vhigh`

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [653]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sal_spw_low+sal_spw_mod+sal_spw_high+sal_spw_vhigh)`

LONG `sum_sal_spw`

STATIC TEXT

E `sum_sal_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER sal_spw_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	- -

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_sal_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Thermal niche of cold adapted species, such as brown trout and Atlantic salmon, will result in a shift in distribution further to the north and that species in the southern part of their distributional areas are likely to go extinct (Ellender et al. 2016)*
- *Winter spawner: An increase in water temperature can lead to a delayed spawning migration (Smialek et al. 2021)*
- *Eggs: Incubation temperatures above 12°C :50 % mortality with 100 % mortality at 15.5 °C (Crisp 1993)*
- *Newly hatched larvae: Thermal limit at 22 °C (Ojanguren et al. 1999)*
- *Smolts: Optimal temperature for sea migration 8-12°C (Hvidsten et al. 1998; Kallio-Nyberg et al. 2011)*
- *Smolt runs are strongly correlated to increasing water temperature and water flow during spring (Froese and Pauly 2021; McCormick et al. 1998)*
- *Adults: Preferred temperature: 4-12°C (www.fishbase.org, Froese and Pauly 2021)*
- *Sexual maturity and fertility of Atlantic salmon and brown trout decrease with rising temperatures (Jonsson and Jonsson 2009)*

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [654] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sal_stt_low -
Moderate I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [655] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sal_stt_mod -
High I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [656] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sal_stt_high -
Very high I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [657] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER sal_stt_vhigh -
VARIABLE `(sal_stt_low+sal_stt_mod+sal_stt_high+sal_stt_vhigh)`	LONG sum_sal_stt

STATIC TEXT

E `sum_sal_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — sal_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

____

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

SENSITIVITY TO DECREASING SALINITY

E `sum_sal_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Alevins (1-6 weeks post-hatch): Increased survival at 8.5 psu and 17 psu (Parry 1960)*
- *Fry (3 month old, ~2 cm): survival decreased with increasing salinity, fish were able to survive ~8.5 psu, however with increasing salinity of 17 psu the survival decreased (Parry 1960)*
- *From fry to smolts: Continuous increase in survival time, related to size (Parry 1960)*
- *Smolt Salinity tolerance: Survival in 40 psu for 96 hours was low, however salinity tolerance (of fish reared under different light regimes) developed by time (Berge et al. 1995)*
- *Smolts survived in 32 psu (McCormick and Regish 2018)*

Low — NUMERIC: INTEGER — sal_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

Moderate — NUMERIC: INTEGER — sal_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne

And 3 other symbols [658]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

High — NUMERIC: INTEGER — sal_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r

And 27 other symbols [659]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

Very high	NUMERIC: INTEGER `sal_sts_vhigh`
I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if And 28 other symbols [660] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	

VARIABLE `(sal_sts_low+sal_sts_mod+sal_sts_high+sal_sts_vhigh)`	LONG `sum_sal_sts`

STATIC TEXT

E `sum_sal_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER `sal_sts_dtq`
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_sal_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• Effects of OA on S. salar during the transition from fresh water to seawater indicates that elevated CO_2 is not likely to affect osmoregulation negatively and may improve early growth in seawater (McCormick and Regish 2018)
• Optimum pH range for adults: pH 6-9 (Smialek et al. 2021)

Low	NUMERIC: INTEGER `sal_sta_low`
I Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [661] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	

Moderate	NUMERIC: INTEGER `sal_sta_mod`
I Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when And 127 other symbols [662] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	

High	NUMERIC: INTEGER sal_sta_high
I Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [663] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	--------------------------------
Very high	NUMERIC: INTEGER sal_sta_vhigh
I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, c And 49 other symbols [664] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	--------------------------------
VARIABLE `(sal_sta_low+sal_sta_mod+sal_sta_high+sal_sta_vhigh)`	LONG sum_sal_sta

STATIC TEXT

E `sum_sal_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER sal_sta_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	--------------------------------

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

POPULATION GROWTH RATE

E `sum_sal_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

Maximum growth rate (r_{max})	• Prior r=0.39 (Froese et al. 2017)
Von Bertalanffy K	• 0.12-0.28 (Baltic Sea)
Age at maturity (t_m)	• 3-5 (UK Wales River)
Maximum age (t_{max})	• 5-6 (UK Scotland)
Natural mortality (M)	• 1.1 (UK. Scotland)
Maximum length (L_{max})	• 126 cm TL

(Froese and Pauly 2021)

Low

NUMERIC: INTEGER sal_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [665]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER sal_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [666]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER sal_pgr_high

I Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [667]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER sal_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [668]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sal_pgr_low+sal_pgr_mod+sal_pgr_high+sal_pgr_vhigh)`

LONG sum_sal_pgr

STATIC TEXT

E `sum_sal_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER sal_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

SENSITIVITY TO OTHER STRESSORS

E `sum_sal_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Low oxygen (Smialek et al. 2021)
• Deterioration of spawning habitat, obstructions in rivers and estuaries, pollution (Heessen et al. 2015)
• Parasite (Gyrodactylus salaris), freshwater acidification, hydropower regulation and other habitat alterations were identified as stabilized population threats (North Sea) (Forseth et al. 2017)
• Colmation and fine sediment deposition main factors for reproductive failure (Sternecker et al. 2014)

Low

NUMERIC: INTEGER

`sal_ost_low`

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
[And 323 other symbols [669]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

`sal_ost_mod`

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
[And 321 other symbols [670]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

`sal_ost_high`

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
[And 321 other symbols [671]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER

`sal_ost_vhigh`

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
[And 315 other symbols [672]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(sal_ost_low+sal_ost_mod+sal_ost_high+sal_ost_vhigh)`

LONG

`sum_sal_ost`

STATIC TEXT

E `sum_sal_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	sal_ost_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3		

ATLANTISCHER LACHS - ATLANTIC SALMON (SALMO SALAR L.) – FOCUS ON BALTIC SALMON

DIRECTION OF EFFECTS

E `sum_sal_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	sal_doe_pos
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	sal_doe_neu
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER	sal_doe_neg
VARIABLE `(sal_doe_pos+sal_doe_neu+sal_doe_neg)`	LONG	sum_sal_doe

STATIC TEXT

E `sum_sal_doe != 4`

The attribute direction of change must have a sum of 4

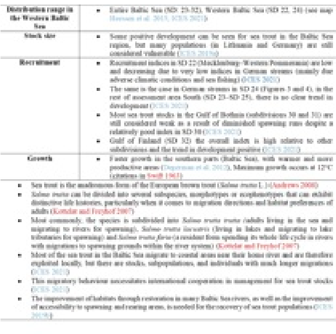
Comments:	TEXT	sal_com

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

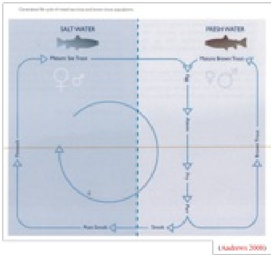
trout

STATIC TEXT

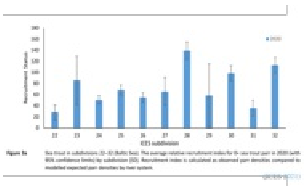
Additional Information:

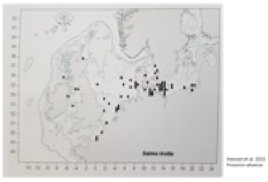


Distribution range in the Western Baltic Sea	[illegible]
Stock size	[illegible]
Recruitment	[illegible]
Growth	[illegible]



STATIC TEXT





MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Freshwater spawning areas: Small brooks to large rivers, small lakes to fjords and coastal waters (Heessen et al. 2015)
• Spawning depth: 8-25 m (Crisp 2000, citation in Smialek et al. 2021)
• Smoltification in freshwater (Rasmussen and Pedersen 2018)
• Marine: Inhabited areas close to the coast for growth, after a half to a couple of years, sea trout migrate back to the rivers for spawning (Rasmussen and Pedersen 2018)

Low

NUMERIC: INTEGER

trt_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul

And 124 other symbols [673]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

trt_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts

And 19 other symbols [674]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High	NUMERIC: INTEGER	trt_hab_high
I Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consi And 132 other symbols [675] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

Very high	NUMERIC: INTEGER	trt_hab_vhigh
I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [676] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

VARIABLE	LONG	sum_trt_hab
`(trt_hab_low+trt_hab_mod+trt_hab_high+trt_hab_vhigh)`		

STATIC TEXT

E `sum_trt_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	trt_hab_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	______________________________	

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

PREY SPECIFICITY

E `sum_trt_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Opportunistic feeder: Small crustaceans, fish (sandeel, sprat, juvenile herring) (Andrews 2008)*
- *Juveniles feed on invertebrates and insects (Klemetsen et al. 2003; Maitland and Linsell 2007)*
- *Adults feed on marine crustaceans, polychaetes and fish, diet changing with season and location (Heessen et al. 2015)*

Low	NUMERIC: INTEGER	trt_prey_low
I Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, And 164 other symbols [677] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	______________________________	

Moderate

NUMERIC: INTEGER `trt_prey_mod`

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [678]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `trt_prey_high`

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [679]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `trt_prey_vhigh`

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [680]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(trt_prey_low+trt_prey_mod+trt_prey_high+trt_prey_vhigh)`

LONG `sum_trt_prey`

STATIC TEXT

E `sum_trt_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER `trt_prey_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

ADULT MOBILITY

E `sum_trt_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *Migrations to spawning areas, few times during life (Heessen et al. 2015)*
- *Recent genetic studies indicate that long-distance migrations are more common than previously recognized (ICES 2019b)*
- *In the Baltic Sea: Hugh variations in migration pattern (Degerman et al. 2012)*

• *Populations in the southern Baltic Sea may undergo long-distance migrations, and overwinter in this brackish sea (Bartel et al. 2001)*
• *Most of the sea trout in the Baltic Sea migrate to coastal areas near their home river (ICES 2021)*

Low I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [681] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_mob_low`
Moderate I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [682] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_mob_mod`
High I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [683] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_mob_high`
Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_mob_vhigh`
VARIABLE `(trt_mob_low+trt_mob_mod+trt_mob_high+trt_mob_vhigh)`	LONG `sum_trt_mob`

STATIC TEXT

E `sum_trt_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `trt_mob_dtq`

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

DISPERSAL OF EARLY LIFE STAGES

E `sum_trt_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Pelagic eggs, planktonic larvae
• Development time is dependent from ambient temperature: 1.5-5 months (Smialek et al. 2019)
• Larvae stay in the interstitial until yolk sac is absorbed, then emerge from the gravel and drift into shallower water areas where they spend juvenile phase and change to exogenous feeding (Bardonnet et al. 1993; McCormick et al. 1998)
• Scotland: spend between 1 and 4 years in fresh water before transforming into smolts, migrating to sea (Middlemas et al. 2009)

Low I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita And 39 other symbols [684] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_els_low`
Moderate I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot And 56 other symbols [685] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_els_mod`
High I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne And 47 other symbols [686] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_els_high`
Very high I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni And 93 other symbols [687] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_els_vhigh`
VARIABLE `(trt_els_low+trt_els_mod+trt_els_high+trt_els_vhigh)`	LONG `sum_trt_els`

STATIC TEXT

E `sum_trt_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER trt_els_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	- -

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_trt_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Egg development in winter (Nov.-Jan.), larval hatching in Feb-March (Smialek et al. 2021)
• Optimum Eggs: 8-10°C; lethal limit: 16-18°C (Ojanguren and Braña 2003)
• Parr stage: 8-10 cm, 9 months (Parry 1960)
• Smoltification is a process of physiological, morphological and behavioural changes preparing juveniles for life in saltwater (Thorstad et al. 2016)
• Juvenile period in the stream, smoltification, a feeding migration in the sea and return migration of maturing adults to their natal river to spawn (Kallio-Nyberg et al. 2006)
• Remain for one year in spawning area, than migration to bigger rivers or as anadromous migratory species into the ocean (Maitland and Linsell 2007)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [688] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_ssr_low -
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [689] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_ssr_mod -
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [690] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_ssr_high -
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [691] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_ssr_vhigh -
VARIABLE `(trt_ssr_low+trt_ssr_mod+trt_ssr_high+trt_ssr_vhigh)`	LONG sum_trt_ssr

STATIC TEXT

E `sum_trt_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: — NUMERIC: INTEGER — `trt_ssr_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_trt_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Anadromous (Jonsson and Jonsson 2009)
• Lithophilic fish species, they deposit their eggs in the interstitial zone of suitable gravel banks (Kondolf 2000; Sternecker et al. 2013)
• At the transition to shallow overflowing gravel riffle stretches, the females cut spawning redds into the riverbed (Smialek et al. 2021)
• Sea trouts require spawning habitats with a gravel bottom and a high exchange between the open water and the interstitial zone for successful reproduction (Kondolf 2000; Sternecker et al. 2013)
• Eggs are incubated for one to several months, buried in gravel and hatching in the subsequent spring (Heessen et al. 2015)
• Spend between 1 and 4 years in fresh water before transforming into smolts, and migrating to sea (Scotland) (Middlemas et al. 2009)
• May spawn several times during their lifetime, annually after first spawning (citations within Thorstad et al. 2016)

Low — NUMERIC: INTEGER — `trt_crs_low`

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — `trt_crs_mod`

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — `trt_crs_high`

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER trt_crs_vhigh

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(trt_crs_low+trt_crs_mod+trt_crs_high+trt_crs_vhigh)`

LONG sum_trt_crs

STATIC TEXT

E `sum_trt_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER trt_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

POPULATION SPAWNING CYCLE

E `sum_trt_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Spawning time: Nov.-Jan., local spawning events extend over two to three weeks (Armstrong et al. 2003; Crisp 1993)

Low

NUMERIC: INTEGER trt_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined "spawning season" is less likely to suffer spawning failur

And 49 other symbols [692]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER trt_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su

And 105 other symbols [693]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER trt_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [694]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER trt_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [695]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(trt_spw_low+trt_spw_mod+trt_spw_high+trt_spw_vhigh)`

LONG sum_trt_spw

STATIC TEXT

E `sum_trt_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER trt_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_trt_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Thermal niche of cold adapted species, such as brown trout and Atlantic salmon, will result in a shift in distribution further to the north and that species in the southern part of their distributional areas are likely to go extinct (Ellender et al. 2016)
• Sea trout frequently are recorded at sea during winter and can tolerate full-salinity sea water at water temperatures as low as 1–2 °C (Thorstad et al. 2016)
• Importance of water temperature as trigger or initiator of smolt migration (Jonsson and Jonsson 2002; Thorstad et al. 2016), migration occurred at 5-13°C (Ireland) (Byrne et al. 2004)
• Small temperature increases (<2.5° C) in winter and spring would be beneficial for growth for1 year-old smolts, water temperatures would have to increase by c. 4° C in winter and spring, and 3° C in summer and autumn before they had a marked negative effect on trout growth (Elliott and Elliott 2010)
• Optimum Eggs: 8-10°C; lethal limit: 16-18°C (Ojanguren and Braña 2003)
• Adult spawners optimum: 4-19°C (Elliott 1981); 9-16°C (Piper et al. 1982 overview table in Smialek et al. 2021)
• Lethal limit adults: 23-30°C (Elliott 1981)

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [696] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_stt_low`
Moderate I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [697] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_stt_mod`
High I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [698] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_stt_high`
Very high I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [699] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `trt_stt_vhigh`
VARIABLE `(trt_stt_low+trt_stt_mod+trt_stt_high+trt_stt_vhigh)`	LONG `sum_trt_stt`

STATIC TEXT

E `sum_trt_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `trt_stt_dtq`

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

SENSITIVITY TO DECREASING SALINITY

E `sum_trt_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• Salinity tolerance increases with increasing size of the fish (Parry 1960)
• Baltic Sea: Sea trout spawn in brackish water, eggs and "alevins" surviving salinities of up to 4-5 psu (Limburg et al. 2001)
• Growth in the northern Baltic Sea is high with respect to the latitude and temperature conditions, possibly indicating that the low salinity is favourable for growth (Degerman et al. 2012)
• No difference was observed in survival or growth rate for young-of-the-year sea trout in freshand brackish Baltic Sea water (6.7 psu) (Landergren 2001)

Low

NUMERIC: INTEGER `trt_sts_low`

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `trt_sts_mod`

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne

And 3 other symbols [700]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `trt_sts_high`

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r

And 27 other symbols [701]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `trt_sts_vhigh`

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if

And 28 other symbols [702]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(trt_sts_low+trt_sts_mod+trt_sts_high+trt_sts_vhigh)`

LONG `sum_trt_sts`

STATIC TEXT

E `sum_trt_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER trt_sts_dtq -

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_trt_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• Freshwater acidification was one of the major environmental threats to aquatic biota, especially in northern Europe and eastern North America in calcium-poor rivers where the buffering capacity of the ecosystems naturally is rather low (Overrein et al. 1980)

Low I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [703] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_sta_low -
Moderate I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [704] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_sta_mod -
High I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [705] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_sta_high -
Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [706] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER trt_sta_vhigh -
VARIABLE `(trt_sta_low+trt_sta_mod+trt_sta_high+trt_sta_vhigh)`	LONG sum_trt_sta

STATIC TEXT

E `sum_trt_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER trt_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

POPULATION GROWTH RATE

E `sum_trt_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- www.fishbase.org, (Froese and Pauly 2021)

Maximum growth rate (r_{max})	• Prior r= 0.46 (Froese et al. 2017)
Von Bertalanffy K	• 0.17-0.39 (Baltic Sea)
Age at maturity (t_m)	• 2-3 (SH, Germany)
Maximum age (t_{max})	• 8 (Sweden)
Natural mortality (M)	• 0.31 (Norway)
Maximum length (L_{inf})	• 40.6 cm TL

Low

NUMERIC: INTEGER trt_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [707]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER trt_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [708]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER trt_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [709]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER trt_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [710]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (trt_pgr_low+trt_pgr_mod+trt_pgr_high+trt_pgr_vhigh)	LONG	sum_trt_pgr

STATIC TEXT

E `sum_trt_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — trt_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

SENSITIVITY TO OTHER STRESSORS

E `sum_trt_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Deterioration of spawning habitat: Many populations are reported to be limited by poor habitat conditions, obstructions in rivers and estuaries, pollution (Heessen et al. 2015; ICES 2021)
• Several wild migratory populations in the Baltic Sea have become extinct and some remaining populations are near extinction (due to fishery, hydropower regulation, inaccessibility of freshwater habitat) (Degerman et al. 2012)
• Predation (e.g. cormorants, seals) (Jepsen et al. 2019)
• Extreme pH values below 6 or above 9 are particularly harmful as they can activate other toxic substances (Crisp 1993; Smialek et al. 2021)
• pH values above 9, the egg stages of salmonids die before hatching (Crisp 1993), the lower limit is 4.5 for Atlantic salmon, brown trout and lake trout (Crisp 1993)
• Oxygen: minimum of 10 mg/L should be available to achieve >50% egg-to-fry survival (Rubin and Glimsäter 1996)

Low — NUMERIC: INTEGER — trt_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [711]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — trt_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [712]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER trt_ost_high

I Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen,
[And 321 other symbols [713]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

Very high

NUMERIC: INTEGER trt_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, preda
[And 315 other symbols [714]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

____

VARIABLE

`(trt_ost_low+trt_ost_mod+trt_ost_high+trt_ost_vhigh)`

LONG sum_trt_ost

STATIC TEXT

E `sum_trt_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER trt_ost_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

____

MEERFORELLE - SEA TROUT (SALMO TRUTTA) – FOCUS ON BALTIC SEA TROUT

DIRECTION OF EFFECTS

E `sum_trt_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

NUMERIC: INTEGER trt_doe_pos

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

____

Neutral

NUMERIC: INTEGER trt_doe_neu

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

Negative

V1 `self.InRange(0,4) || self == null`
M1 Value must be between 0 and 4

NUMERIC: INTEGER trt_doe_neg

VARIABLE
(trt_doe_pos+trt_doe_neu+trt_doe_neg)

LONG sum_trt_doe

STATIC TEXT

E `sum_trt_doe != 4`

The attribute direction of change must have a sum of 4

Comments:

TEXT trt_com

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

eel

STATIC TEXT

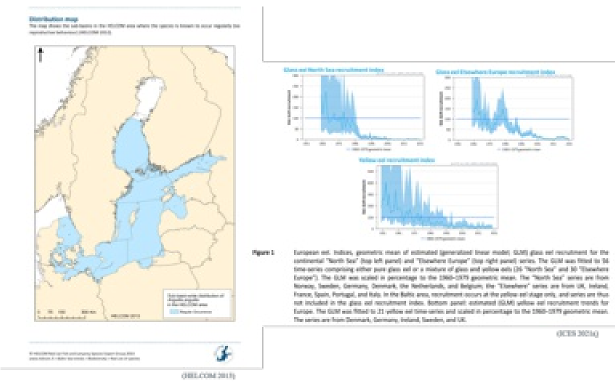
Additional Information:

References in Population growth for eel, perch, northern pike and pike perch are indicated by color of nearby study area.

Distribution range in the Western Baltic Sea	• Throughout the Baltic Sea in coastal and adjacent freshwater habitats (HELCOM 2013)
Stock size	• Critically endangered. Stock decline, recovery will be a long-term process (FAO/ICES 2011), stock status is affected by stocking (Thiel et al. 2013)
Recruitment	• Dramatic decline in recruitment of glass and yellow eel coming to European waters since 1980, no sign of recovery (FAO/ICES 2011; ICES 2020)
Growth	• Growth rate (Atlantic): TL 0.19-0.24 mm/d; 5.3 mm/month (Boetius and Harding 1985; Lecomte-Finiger 1992), 0.26-0.30 mm/d (Lecomte-Finiger 1992)

- Status of European eel remains critical, reference points undefined (ICES 2020)
- Listed in HELCOM Red List: critically endangered (HELCOM 2013)
- All life stages of European eel, including newly arriving glass eels, growing yellow eel and maturing migrating silver eel, are commercially exploited (HELCOM 2013)

STATIC TEXT



EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Natal homing to the spawning area Sargasso Sea (Lecomte-Finiger 1992)
• Juveniles inhabit rivers, freshwater streams, lakes ponds, estuaries and coastal lagoons, living on the bottom, under stones, in mud (Froese and Pauly 2021; Tzeng et al. 2000)
• Eels do not necessarily migrate into freshwater streams during growth (Baltic Sea) (Tzeng et al. 2000)
• Juveniles prefer coarse gravel as benthic habitat (Christoffersen et al. 2018)

Low

NUMERIC: INTEGER — eel_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul
[And 124 other symbols [715]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eel_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts
[And 19 other symbols [716]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `eel_hab_high`

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi
[And 132 other symbols [717]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `eel_hab_vhigh`

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
[And 164 other symbols [718]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE
`(eel_hab_low+eel_hab_mod+eel_hab_high+eel_hab_vhigh)`

LONG `sum_eel_hab`

STATIC TEXT

E `sum_eel_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER `eel_hab_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

PREY SPECIFICITY

E `sum_eel_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Estuarine food: Amphipods and the shore crab, Carcinus maenas (L.), were the most important food items (Costa et al. 1992)
• In more saline muddy bottom areas polychaetes, bivalves and shrimp, fish (Costa et al. 1992)

Low

NUMERIC: INTEGER `eel_prey_low`

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
[And 164 other symbols [719]]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eel_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [720]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — eel_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [721]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — eel_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [722]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eel_prey_low+eel_prey_mod+eel_prey_high+eel_prey_vhigh)`

LONG — sum_eel_prey

STATIC TEXT

E `sum_eel_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — eel_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

ADULT MOBILITY

E `sum_eel_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Highly migratory, migrating from freshwater habitats to the Sargasso Sea for reproduction (ICES 2021b)

Low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [723]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eel_mob_low

---------------------------------.

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [724]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eel_mob_mod

---------------------------------.

High

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [725]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eel_mob_high

---------------------------------.

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eel_mob_vhigh

---------------------------------.

VARIABLE
`(eel_mob_low+eel_mob_mod+eel_mob_high+eel_mob_vhigh)`

LONG — sum_eel_mob

STATIC TEXT

E `sum_eel_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — eel_mob_dtq

---------------------------------.

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

DISPERSAL OF EARLY LIFE STAGES

E `sum_eel_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Eggs are pelagic, newly hatched leptocephalus larvae drift with the ocean currents to the continental shelf of Europe and North Africa, where they metamorphose into glass eels and enter continental waters (ICES 2021b)
• Larvae seem to be capable of active swimming (Lecomte-Finiger 1992; McCleave et al. 1998)
• Migration time of leptocephali: less than one year (eastern Atlantic) (Lecomte-Finiger 1992), larval stage duration: 7-11 months (citation in Lecomte-Finiger 1992)
• Metamorphosis into glass eels takes place over the continental shelf before migrating upstream as juveniles (elvers), (33-76 d, depending from distance from the continental slope to the respective estuaries (Lecomte-Finiger 1992)

Low

NUMERIC: INTEGER — `eel_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [726]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `eel_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [727]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `eel_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [728]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `eel_els_vhigh`

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [729]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eel_els_low+eel_els_mod+eel_els_high+eel_els_vhigh)`

LONG — `sum_eel_els`

STATIC TEXT

E `sum_eel_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER eel_els_dtq _ .

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_eel_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Pelagic eggs, planktonic larvae (Froese and Pauly 2021)*
- *Egg fertilization success: 30-40 psu, neutral buoyancy could be sustained (Sørensen et al. 2015)*
- *Larval stage duration: 7- 11 months (Lecomte-Finiger and Yahyaoui 1989)*
- *Leptocephalus larvae drift with the ocean currents to the continental shelf of Europe and North Africa, where they metamorphose into glass eels and enter continental waters (ICES 2021b)*
- *Hydrozoa plankton are important in the diet of A. anguilla larvae in Sargasso Sea (Ayala et al. 2018)*
- *growth stage, known as yellow eel, may take place in marine, brackish (transitional), or freshwaters (ICES 2021b)*
- *Yellow eel stage may last typically from two to 25 years (and can exceed 50 years) prior to metamorphosis to the "silver eel" stage, maturation and spawning migration (ICES 2021b)*

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [730] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eel_ssr_low _ .
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [731] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eel_ssr_mod _ .
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [732] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eel_ssr_high _ .
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [733] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eel_ssr_vhigh _ .
VARIABLE `(eel_ssr_low+eel_ssr_mod+eel_ssr_high+eel_ssr_vhigh)`	LONG sum_eel_ssr

STATIC TEXT

E `sum_eel_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER eel_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_eel_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Catadromous, complex life history and semelparous (death after first reproduction) (ICES 2021b)
• Spawning area in the southwestern part of the Sargasso Sea (ICES 2021b)
• Spawning migration to sea starts: male (30-40 cm, usually 6-12 years), females (55-65 cm, 10-20 years old), spawn at ocean depths of 400-700 m in mid-winter (www.fishbase.org, Froese and Pauly 2021)
• Panmixia is assumed, however, global genetic differentiation could be found (Atlantic, Baltic, Mediterranean Sea) (Wirth and Bernatchez 2001)
• Sexual maturity: 8-18 years (Maitland and Linsell 2007)

Low

NUMERIC: INTEGER eel_crs_low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER eel_crs_mod

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER eel_crs_high

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER eel_crs_vhigh

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE
`(eel_crs_low+eel_crs_mod+eel_crs_high+eel_crs_vhigh)`

LONG

`sum_eel_crs`

STATIC TEXT

E `sum_eel_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

`eel_crs_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

POPULATION SPAWNING CYCLE

E `sum_eel_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• *Once in a life time, between March and June in Sargasso Sea (Froese and Pauly 2021)*

Low

NUMERIC: INTEGER

`eel_spw_low`

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [734]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

`eel_spw_mod`

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [735]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

`eel_spw_high`

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [736]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli [And 134 other symbols [737]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER eel_spw_vhigh

VARIABLE

`(eel_spw_low+eel_spw_mod+eel_spw_high+eel_spw_vhigh)`

LONG sum_eel_spw

STATIC TEXT

E `sum_eel_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER eel_spw_dtq

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_eel_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Optimum growth: 22-23°C (Sadler 1979)*
- *Lethal temp: 38°C, state of torpor could be observed at 1-3 °C, when acclimated at 29-23°C (Sadler 1979)*
- *Highest water temperature tolerated by eels: 31.5 °C (Claësson et al. 2016)*
- *Water temperature is assumed to affect upstream migration, colder temperatures are preferred (11-12°C) (Tosi et al. 1988)*

Low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures [And 326 other symbols [738]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER eel_stt_low

Moderate

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat [And 336 other symbols [739]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `eel_stt_mod`

High

I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te [And 400 other symbols [740]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `eel_stt_high`

Very high

I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp [And 341 other symbols [741]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `eel_stt_vhigh`

VARIABLE

`(eel_stt_low+eel_stt_mod+eel_stt_high+eel_stt_vhigh)`

LONG — `sum_eel_stt`

STATIC TEXT

E `sum_eel_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `eel_stt_dtq`

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

SENSITIVITY TO DECREASING SALINITY

E `sum_eel_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Anadromous, Reproduction in marine Sargasso Sea*
- *Marine and estuarine eels grow faster than river eels (Edeline et al. 2005)*

Low

NUMERIC: INTEGER — eel_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Population is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eel_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitne
And 3 other symbols [742]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — eel_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [743]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — eel_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if
And 28 other symbols [744]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eel_sts_low+eel_sts_mod+eel_sts_high+eel_sts_vhigh)`

LONG — sum_eel_sts

STATIC TEXT

E `sum_eel_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	*"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "*
2	*"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."*
1	*"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "*
0	*"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "*

Data Quality Score:

NUMERIC: INTEGER — eel_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_eel_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [745] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `eel_sta_low`
Moderate I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [746] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `eel_sta_mod`
High I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [747] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `eel_sta_high`
Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [748] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `eel_sta_vhigh`
VARIABLE `(eel_sta_low+eel_sta_mod+eel_sta_high+eel_sta_vhigh)`	LONG `sum_eel_sta`

STATIC TEXT

E `sum_eel_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `eel_sta_dtq`

POPULATION GROWTH RATE

E `sum_eel_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (www.fishbase.org, (Froese and Pauly 2021))

Maximum growth rate (r_{max})	• Prior r= 0.20 (Froese et al. 2017)
Von Bertalanffy K	• 0.13-0.16 (Western Baltic Sea)
Age at maturity (t_m)	• 11 (SH, Germany)
Maximum age (t_{max})	• 20-23 (Finland/Germany)
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 77.8 cm TL

Low

NUMERIC: INTEGER — eel_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [749]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eel_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [750]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — eel_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [751]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — eel_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [752]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eel_pgr_low+eel_pgr_mod+eel_pgr_high+eel_pgr_vhigh)`

LONG — sum_eel_pgr

STATIC TEXT

E `sum_eel_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER eel_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

SENSITIVITY TO OTHER STRESSORS

E `sum_eel_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Threats: Fishing, migration barriers, alien species, hydropower plants (HELCOM 2013; ICES 2020)
• Pollution, chemical contaminants might affect spawning success, infection with parasite Anguillicoloides crassus (HELCOM 2013)
• Hydropower, pumping stations, and other water intakes; habitat loss or degradation; pollution, diseases, and parasites; and other management actions that may affect levels of predation (e.g. conservation vs. control of predators). Climate change may have further effects, but these are not understood (ICES 2021a)
• Changes in major current systems will affect recruitment of larvae and glass eels change in SST in the Sargasso Sea impact on productivity (Prigge 2013)
• Eels are able to regulate and compensate to low levels of dissolved O_2 (Cruz-Neto and Steffensen 1997)

Low

NUMERIC: INTEGER eel_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [753]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER eel_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [754]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER eel_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [755]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, preda
[And 315 other symbols [756]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `eel_ost_vhigh`

VARIABLE

`(eel_ost_low+eel_ost_mod+eel_ost_high+eel_ost_vhigh)`

LONG — `sum_eel_ost`

STATIC TEXT

E `sum_eel_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `eel_ost_dtq`

EUROPÄISCHER AAL - EUROPEAN EEL (ANGUILLA ANGUILLA)

DIRECTION OF EFFECTS

E `sum_eel_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER — `eel_doe_pos`

Neutral

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER — `eel_doe_neu`

Negative

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER — `eel_doe_neg`

VARIABLE

`(eel_doe_pos+eel_doe_neu+eel_doe_neg)`

LONG — `sum_eel_doe`

STATIC TEXT

E `sum_eel_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT eel_com

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

perch

STATIC TEXT

Additional Information:

References in Population growth for eel, perch, northern pike and pike perch are indicated by color of nearby study area.

Distribution range in the Western Baltic Sea	• Southwestern Baltic Sea (Ljunggren et al. 2010), northern Baltic Sea (Finland) (Lappalainen et al. 2001)
Stock size	• Abundance has declined substantially over the last few decades (Western Baltic Sea) (Ljunggren et al. 2010)
Recruitment	• Recruitment failure is related to mortality of early stage larvae at the onset of exogenous feeding (zooplankton limitation) (Ljunggren et al. 2010)
Growth	• Growth rate is not different in estuaries and freshwater habitats (Christensen et al. 2021) • Larvae: Growth coefficient (G; 1/d): 0.173 (www.fishbase.org, Froese and Pauly 2021)

- It is suggested that although genetically homogenous population in the Baltic Sea, the population show differences in behavior, such as using different habitats, foraging areas, specialized in different prey types, could lead to geographically small-scaled phenotypic differences (Ahlbeck Bergendahl et al. 2017)
- A regional study in the southwestern Baltic Sea suggests that the decline in pike and perch may have been caused by recruitment failure (Nilsson et al. 2004)

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Freshwater species, adapted to brackish waters (Lappalainen et al. 2001)
• No special requirements for spawning areas (Lappalainen et al. 2001)
• Estuarine lagoons, lakes of all types/medium streams (www.fishbase.org, Froese and Pauly 2021)
• Juveniles (young-of-the-year): feeding areas to deeper waters with macrophytes (Urho et al. 1990)
• Depth range: 1-30, usually 3-4 m (citations in www.fishbase.org, (Froese and Pauly 2021)

Low

NUMERIC: INTEGER — per_hab_low

I Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The popul
And 124 other symbols [757]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _.

Moderate

NUMERIC: INTEGER — per_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in otper habitats (with possible impacts
And 19 other symbols [758]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _.

High

NUMERIC: INTEGER — per_hab_high

I Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [759]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

_ _.

Very high	NUMERIC: INTEGER per_hab_vhigh
I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater And 164 other symbols [760] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________

VARIABLE	LONG sum_per_hab
`(per_hab_low+per_hab_mod+per_hab_high+per_hab_vhigh)`	

STATIC TEXT

E `sum_per_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER per_hab_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	________________________________

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

PREY SPECIFICITY

E `sum_per_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Food generalists (feed on zooplankton, zoobenthos, fish) (Lappalainen et al. 2001)
• Ontogenetic diet shifts: young-of-the-year fish feed on zooplankton, as they grow they switch to benthos and become piscivorous (Ahlbeck Bergendahl et al. 2017; Thorpe 1977)
• Age 1+ feed primarily on mysid shrimps and benthic invertebrates (Ahlbeck Bergendahl et al. 2017)
• Adults feed mainly on macro-crustaceans and fish (gobies, herring, three-spined stickleback) (Lappalainen et al. 2001)
• Northern Baltic Sea: high proportion of insects in diet (Lappalainen et al. 2001)

Low	NUMERIC: INTEGER per_prey_low
I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, And 164 other symbols [761] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________

Moderate

NUMERIC: INTEGER per_prey_mod

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [762]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER per_prey_high

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [763]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER per_prey_vhigh

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [764]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(per_prey_low+per_prey_mod+per_prey_high+per_prey_vhigh)`

LONG sum_per_prey

STATIC TEXT

E `sum_per_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER per_prey_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

ADULT MOBILITY

E `sum_per_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Consistent annual migration pattern, residing in a bay during summer while being in a delta during autumn, winter, and spring (Western Baltic Sea) (Christensen et al. 2021)
• Perform spawning migrations within 10-30 km ranges (Collette et al. 1977), tend to return to their home area (population of Ijssel Lake (Netherlands) (Willemsen 1977)

Low

NUMERIC: INTEGER

per_mob_low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition

[And 2 other symbols [765]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

per_mob_mod

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita

[And 59 other symbols [766]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

per_mob_high

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity

[And 122 other symbols [767]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER

per_mob_vhigh

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(per_mob_low+per_mob_mod+per_mob_high+per_mob_vhigh)`

LONG

sum_per_mob

STATIC TEXT

E `sum_per_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

per_mob_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_per_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Demersal eggs are laid in sticky strings, found over submerged objects, grouped in long white ribbons (www.fishbase.org, Froese and Pauly 2021; Maitland and Linsell 2007)
• Upon hatching, larvae struggle to the surface to get air in order to inflate the swim bladder and embark on a planktonic existence for a short duration (www.fishbase.org, Froese and Pauly 2021)
• Larvae are in close association with substrate (British Isles, North Sea) (Froese and Pauly 2021)

Low

NUMERIC: INTEGER — per_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [768]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — per_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [769]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — per_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [770]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — per_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [771]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(per_els_low+per_els_mod+per_els_high+per_els_vhigh)`

LONG — sum_per_els

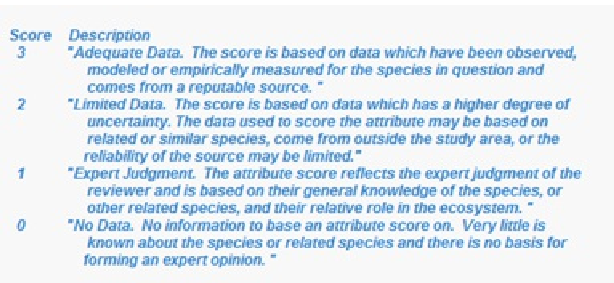
STATIC TEXT

E `sum_per_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	per_els_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	________________________________	

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_per_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

- *Eggs and larvae are less tolerant to brackish waters than adults (Ložys 2004)*
- *Eggs hatch in about 8 to 16 days at normal temperatures, males mature at 2-3 years and females at 4 years*
- *Spawning, in the Northern hemisphere, happens in spring in waters with temperatures between 7-8°C, eggs are laid in sticky strings becoming fixed to aquatic plants and rocks, egg size 2.0-2.5mm, larval length at hatching 5 mm (www.fishbase.org, Froese and Pauly 2021)*
- *Larvae are in close association with substrate (British Isles, North Sea) (Froese and Pauly 2021)*
- *Larvae and small juveniles prey on planktonic invertebrates (www.fishbase.org, Froese and Pauly 2021)*
- *Age-1+ perch are sedentary at least during summer, short feeding ranges of 1-2 km with strong site fidelity (Ahlbeck Bergendahl et al. 2017)*

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [772] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	per_ssr_low
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [773] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	per_ssr_mod
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [774] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	per_ssr_high
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [775] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ________________________________	per_ssr_vhigh
VARIABLE `(per_ssr_low+per_ssr_mod+per_ssr_high+per_ssr_vhigh)`	LONG	sum_per_ssr

STATIC TEXT

E `sum_per_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: NUMERIC: INTEGER per_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_per_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

- *Anadromous life in subpopulations in the Western Baltic Sea (Christensen et al. 2021)*
- *Annual spawner with synchronous oocyte growth during fall through winter (Hokanson 1977)*
- *Demersal, spring spawning fish (Hansson et al. 2019)*
- *Temperate mesotherm: Gonadal growth phase in fall and winter (< 12°C), spawning temperature, lowest: 5 °C, highest 19°C (Hokanson 1977)*
- *Spawning depths: 0.5-3m (Collette et al. 1977; Hergenrader 1969)*
- *Eggs are found over submerged objects, grouped in long white ribbons (www.fishbase.org, Froese and Pauly 2021; Maitland and Linsell 2007)*
- *Homing behaviour (Christensen et al. 2021; Siddika and Lehtonen 2004)*

Low NUMERIC: INTEGER per_crs_low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER per_crs_mod

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER per_crs_high

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high | NUMERIC: INTEGER | per_crs_vhigh

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE | LONG | sum_per_crs

`(per_crs_low+per_crs_mod+per_crs_high+per_crs_vhigh)`

STATIC TEXT

E `sum_per_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: | NUMERIC: INTEGER | per_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

POPULATION SPAWNING CYCLE

E `sum_per_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Spawning frequency: One clear seasonal peak per year (Froese and Pauly 2021)*
- *Spring spawning fish (Christensen et al. 2021; Hansson et al. 2019)*

Low | NUMERIC: INTEGER | per_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur

And 49 other symbols [776]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate | NUMERIC: INTEGER | per_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su

And 105 other symbols [777]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — per_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [778]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — per_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [779]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(per_spw_low+per_spw_mod+per_spw_high+per_spw_vhigh)`

LONG — sum_per_spw

STATIC TEXT

E `sum_per_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — per_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_per_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Adapted to temperate climate, lethal temperatures from 29-35°C, physiological optimum, 20-28°C (Hokanson 1977)
• High winter temperatures may retard maturation and damage oocyte formation in Perca spp. (Hokanson 1977)
• Temperature tolerance embryo: 6-20 °C (Hokanson 1977)
• Preferred warm water (18 °C) when given a choice between warm and cold water (12 °C) (Dainys et al. 2019)
• positive climate effects have been documented for local perch stocks in the inner basins of the Baltic Sea (Ådjers et al. 2006)

Low I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures [And 326 other symbols [780]](#) V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER per_stt_low
Moderate I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat [And 336 other symbols [781]](#) V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER per_stt_mod
High I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te [And 400 other symbols [782]](#) V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER per_stt_high
Very high I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp [And 341 other symbols [783]](#) V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER per_stt_vhigh
VARIABLE `(per_stt_low+per_stt_mod+per_stt_high+per_stt_vhigh)`	LONG sum_per_stt

STATIC TEXT

E `sum_per_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER per_stt_dtq

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

SENSITIVITY TO DECREASING SALINITY

E `sum_per_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• Stenohaline species: European perch in the Western Baltic Sea (estuaries) lived on the edge of the species salinity tolerance (17.5 psu) (Christensen et al. 2021)
• May occur at temporary salinities up to 22 (Christensen et al. 2021)
• Interaction between salinity and temperature on aerobic scope shows that high salinity habitats are energetically beneficial during warm periods (summer), whereas low salinity habitats are energetically beneficial during cold periods (winter) (Christensen et al. 2017)
• Brackish water (salinity 3 and 6) has neither a negative nor a positive effect on growth rates among perch young-of-the-year, when compared to freshwater, behavioural experiments demonstrated that perch prefer to remain in brackish water (salinity 6) (Dainys et al. 2019)
• Eggs: Hatching occurred in 4, 7, 10, 12 psu, successful hatching at 12 psu (Christensen et al. 2016)

Low

NUMERIC: INTEGER — per_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — per_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne
And 3 other symbols [784]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — per_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [785]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — per_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if
And 28 other symbols [786]
V1 `self.InRange(0,5) || self == null`
M1 Value must be between 0 and 5

VARIABLE
`(per_sts_low+per_sts_mod+per_sts_high+per_sts_vhigh)`
LONG — sum_per_sts

STATIC TEXT

E `sum_per_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	per_sts_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	------------------------------------	

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_per_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low	NUMERIC: INTEGER	per_sta_low
I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [787] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
Moderate	NUMERIC: INTEGER	per_sta_mod
I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [788] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
High	NUMERIC: INTEGER	per_sta_high
I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [789] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
Very high	NUMERIC: INTEGER	per_sta_vhigh
I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [790] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	------------------------------------	
VARIABLE `(per_sta_low+per_sta_mod+per_sta_high+per_sta_vhigh)`	LONG	sum_per_sta

STATIC TEXT

E `sum_per_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

per_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

POPULATION GROWTH RATE

E `sum_per_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (Froese and Pauly 2021)

Maximum growth rate (r_{max})	• No data/information
Von Bertalanffy K	• 0.19-0.27 (Sweden)
Age at maturity (t_m)	• 3-5 (Finland)
Maximum age (t_{max})	• 22 (Sweden)
Natural mortality (M)	• 0.29 (Sweden, Scotland)
Maximum length (L_{inf})	• 36.3 cm TL

Low

NUMERIC: INTEGER

per_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum

And 30 other symbols [791]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

per_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.

And 60 other symbols [792]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER

per_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25

And 88 other symbols [793]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER

per_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25

And 79 other symbols [794]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

(per_pgr_low+per_pgr_mod+per_pgr_high+per_pgr_vhigh)

LONG

sum_per_pgr

STATIC TEXT

E sum_per_pgr != 5

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER

per_pgr_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

SENSITIVITY TO OTHER STRESSORS

E sum_per_pgr == 5

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Limited food availability is related to recruitment in open coasts (Western and Northern Baltic Sea) (Ljunggren et al. 2010)
• Food competition with sprat or stickleback for larval perch prey: Zooplankton (Ljunggren et al. 2010)
• pH: Eggs and larvae: most sensitive, adults most tolerant (at pH 3.5)
• Critical acidity for perch survival: pH 5 (Hildén and Hirvi 1987)
• Drainage of acidic soils, most acidic conditions are found in areas where river water dominates, in estuary of Kyrönjoki, Baltic Sea (<2 psu) (Hildén and Hirvi 1987)
• Interaction between low pH (<5.1) and duration of acidic conditions, short duration (< 48h) larvae survived, lethal when longer duration (Hildén and Hirvi 1987)

Low

NUMERIC: INTEGER

per_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low oxy

And 322 other symbols [795]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

per_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,

And 320 other symbols [796]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High

I Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, p
[And 319 other symbols [797]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER per_ost_high

_ _

Very high

I Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predat
[And 314 other symbols [798]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER per_ost_vhigh

_ _

VARIABLE
`(per_ost_low+per_ost_mod+per_ost_high+per_ost_vhigh)`

LONG sum_per_ost

STATIC TEXT

E `sum_per_ost != 5`

The attribute otper stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER per_ost_dtq

_ _

FLUSSBARSCH - EUROPEAN PERCH (PERCA FLUVIATILIS)

DIRECTION OF EFFECTS

E `sum_per_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER per_doe_pos

_ _

Neutral

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER per_doe_neu

_ _

	Negative	NUMERIC: INTEGER	per_doe_neg
V1	`self.InRange(0,4) || self == null`		
M1	Value must be between 0 and 4		
	VARIABLE `(per_doe_pos+per_doe_neu+per_doe_neg)`	LONG	sum_per_doe

STATIC TEXT

E `sum_per_doe != 4`

The attribute otper stressors must have a sum of 4

Comments:	TEXT	per_com

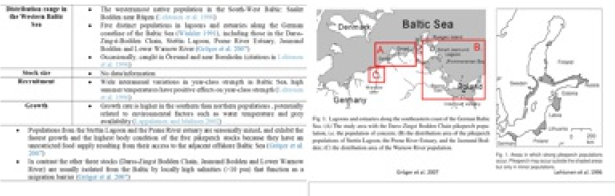
ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

`pikeperch`

STATIC TEXT

Additional Information:

References in Population growth for eel, perch, northern pike and pike perch are indicated by color of nearby study area.



ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Potamodromous: Large rivers, eutrophic lakes, brackish coastal lakes and estuaries (www.fishbase.org) (Froese and Pauly 2021; Riede 2004)
• Spawning grounds are situated in shallow inlets and bays (Lehtonen and Toivonen 1987), in 1-3 m depth (Lappalainen et al. 2003)
• Locally abundant in coastal and littoral areas throughout the Baltic, except the most saline parts of the south-west Baltic Sea (Lehtonen et al. 1996)
• Preferred habitats for young and adults: pelagic or open areas of sheltered coasts, close to shoreline (Thiel 1991; Winkler et al. 1994)
• Distribution depends on areas where water warm up early in spring/summer (Lehtonen et al. 1996)

Low

NUMERIC: INTEGER `ppe_hab_low`

I Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The popul
And 124 other symbols [799]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `ppe_hab_mod`

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts
And 19 other symbols [800]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `ppe_hab_high`

I Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consi
And 132 other symbols [801]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater
[And 164 other symbols [802]](#)

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_hab_vhigh

VARIABLE

`(ppe_hab_low+ppe_hab_mod+ppe_hab_high+ppe_hab_vhigh)`

LONG — sum_ppe_hab

STATIC TEXT

E `sum_ppe_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — ppe_hab_dtq

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

PREY SPECIFICITY

E `sum_ppe_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Adults: piscivorous predator (oligohaline waters: smelt, ruff, roach, perch, pikeperch; mesohaline waters: herring) (Winkler 1989)
• Cannibalism (Winkler 1989)
• Larvae/Juveniles are feeding on zooplankton (Froese and Pauly 2021), become piscivorous in their first summer, in absence of fish larvae: mysid shrimps important prey items (Thiel 1989)

Low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,
[And 164 other symbols [803]](#)

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_prey_low

Moderate

I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of
And 184 other symbols [804]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_prey_mod

High

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [805]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_prey_high

Very high

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [806]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_prey_vhigh

VARIABLE

`(ppe_prey_low+ppe_prey_mod+ppe_prey_high+ppe_prey_vhigh)`

LONG — sum_ppe_prey

STATIC TEXT

E `sum_ppe_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — ppe_prey_dtq

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

ADULT MOBILITY

E `sum_ppe_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

- *More migratory than perch, some long migrations are reported, but average distance does not exceed 10-20 km (Willemsen 1977), less than 35 km (Lappalainen et al. 2003)*
- *In brackish waters, some pikeperch have been observed to migrate as far as 250 km (Lehtonen and Toivonen 1987)*
- *Seasonal migrations between Curonian Lagoon and coastal waters of the Baltic Sea (Ložys 2004)*

Low I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition And 2 other symbols [807] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	ppe_mob_low
Moderate I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita And 59 other symbols [808] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	ppe_mob_mod
High I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity And 122 other symbols [809] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	ppe_mob_high
Very high I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER ----------------------------------	ppe_mob_vhigh
VARIABLE `(ppe_mob_low+ppe_mob_mod+ppe_mob_high+ppe_mob_vhigh)`	LONG	sum_ppe_mob

STATIC TEXT

E `sum_ppe_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER ----------------------------------	ppe_mob_dtq

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

DISPERSAL OF EARLY LIFE STAGES

E `sum_ppe_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Benthic eggs: Pikeperch eggs are agglutinative and are attached on the ground or plant roots, in nests (Lappalainen et al. 2003)
• Larvae live during the first two weeks post hatching near the bottom, then changing their habitat from benthic to pelagic (Western Baltic Sea) (Thiel 1991, Winkler et al. 1994)

Low

NUMERIC: INTEGER ppe_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [810]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER ppe_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [811]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER ppe_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [812]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER ppe_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [813]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(ppe_els_low+ppe_els_mod+ppe_els_high+ppe_els_vhigh)`

LONG sum_ppe_els

STATIC TEXT

E `sum_ppe_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER ppe_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_ppe_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Small eggs, average size: 0.9 mm (citations in Lappalainen et al. 2003)
• The largest and best quality eggs are found in 5-7 age repeated spawner, larvae from small eggs show low viability after hatching (Schlumberger and Proteau 1996)
• Incubation temperature < 20°C to avoid deformities and larvae lethal temperature: below 10°C (citation in Schlumberger and Proteau 1996)
• Threshold salinity for normal egg development: 2.5-3 psu (Deelder and Willemsen 1964)
• Optimal temperatures for hatching period: 12-18°C, values below 6°C are lethal (Western Baltic Sea) (citation in Gröger et al. 2007)
• Peak larval abundance occurs between May and June (Baltic Sea) (Lehtonen et al. 1996; Winkler et al. 1989)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [814] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `ppe_ssr_low` ________________________________
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [815] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `ppe_ssr_mod` ________________________________
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [816] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `ppe_ssr_high` ________________________________
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [817] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `ppe_ssr_vhigh` ________________________________
VARIABLE `(ppe_ssr_low+ppe_ssr_mod+ppe_ssr_high+ppe_ssr_vhigh)`	LONG `sum_ppe_ssr`

STATIC TEXT

E `sum_ppe_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER ppe_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_ppe_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Guarding and nest-spawning phytophils (Balon et al. 1977)
• Males build nests and protect the brood (Collette et al. 1977), spawning takes place in shallow sand and gravel bottoms, depth of 1 to several meters (Collette et al. 1977), protected from direct sunlight (Schlumberger and Proteau 1996)
• Oldest and largest individuals spawn first, younger and smaller ones follow later (citation in Lappalainen et al. 2003)
• Baltic pikeperch spawn in estuaries, inlets and shallow bays (Lehtonen et al. 1996), depending on water temperature (Hokanson 1977)
• During warm springs and summers, the spawning occurs earlier (citations in Lappalainen et al. 2003)
• Delay in spawning due to cold weather and hard winds (Lappalainen et al. 2003)
• Synchronous oocyte growth. Female spawn once a year, spawning all eggs at once (Hokanson 1977)
• Age at 1st reproduction: 24-36 months (Schlumberger and Proteau 1996)
• Fecundity seems to be higher in Baltic Sea than in freshwater populations (citation in Lehtonen et al. 1996)
• Tendency for homing (population of Ijssel Lake (Netherlands)) (North Sea) (Willemsen 1977)
• Homing is well developed with no differences within brackish or freshwater populations (Jepsen et al. 1999; Lappalainen et al. 2003)

Low

NUMERIC: INTEGER ppe_crs_low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER ppe_crs_mod

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER ppe_crs_high

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — ppe_crs_vhigh

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(ppe_crs_low+ppe_crs_mod+ppe_crs_high+ppe_crs_vhigh)`

LONG — sum_ppe_crs

STATIC TEXT

E `sum_ppe_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — ppe_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

POPULATION SPAWNING CYCLE

E `sum_ppe_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Annual spawner, laying all eggs at one time (Hokanson 1977)*
- *Spawning period is in April-May (Southern Baltic Sea), in northern areas later in June-July (Lappalainen et al. 2003; Urho et al. 1990; Winkler et al. 1989)*

Low

NUMERIC: INTEGER — ppe_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur

And 49 other symbols [818]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — ppe_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su

And 105 other symbols [819]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [820]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_spw_high

Very high

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [821]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_spw_vhigh

VARIABLE

`(ppe_spw_low+ppe_spw_mod+ppe_spw_high+ppe_spw_vhigh)`

LONG — sum_ppe_spw

STATIC TEXT

E `sum_ppe_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — ppe_spw_dtq

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_ppe_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Poor reproduction was reported in summer after mild winter without freezing (Southern France, Schlumberger and Proteau 1996), sufficient resting period is needed (Lappalainen et al. 2003)
• Warmer summers will produce stronger pikeperch year-classes that consequently contribute significantly to the future catches (Baltic Sea) (Pekcan-Hekim et al. 2011)
• Spawning can start at temperatures as low as 3-4°C (Lappalainen et al. 2003), spawning starts at 10-14°C (citations in Lehtonen et al. 1996)
• Reabsorbing eggs after a cold spring delayed spawning migration in Don River (Russia) (Golovanenko et al. 1970)
• 8-16°C (12°C-16°C) optimum temperature for development (Kokurewicz 1969; Lappalainen et al. 2003)
• > 20°C: number of normally hatched larvae decreased (Muntyan 1977)
• Phenological changes: During warm springs and summers, the spawning occurs earlier (citations in Lappalainen et al. 2003)
• Delay in spawning due to cold weather and hard winds (Lappalainen et al. 2003)

Low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures And 326 other symbols [822]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_stt_low

Moderate

I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [823]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_stt_mod

High

I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [824]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_stt_high

Very high

I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [825]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_stt_vhigh

VARIABLE

`(ppe_stt_low+ppe_stt_mod+ppe_stt_high+ppe_stt_vhigh)`

LONG — sum_ppe_stt

STATIC TEXT

E `sum_ppe_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — ppe_stt_dtq

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

SENSITIVITY TO DECREASING SALINITY

E `sum_ppe_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• *Highest survival at 0.7 psu, lethal threshold: 6.7 psu in laboratory experiments (Klinkhardt and Winkler, 1989)*
• *Larvae: Lethal salinity limit > 4.75 psu (Lehtonen et al. 1996)*
• *Threshold salinity for normal development: 2.5-3 psu (Deelder and Willemsen 1964)*
• *Adults: tolerate relatively high salinities of 9-10 psu (Lehtonen et al. 1996), however, early life stages are not able to survive in this area*

Low

NUMERIC: INTEGER — ppe_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — ppe_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne
And 3 other symbols [826]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — ppe_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [827]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — ppe_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if
And 28 other symbols [828]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(ppe_sts_low+ppe_sts_mod+ppe_sts_high+ppe_sts_vhigh)`

LONG — sum_ppe_sts

STATIC TEXT

E `sum_ppe_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — ppe_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_ppe_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect
And 118 other symbols [829]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_sta_low

Moderate

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when
And 127 other symbols [830]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_sta_mod

High

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi
And 118 other symbols [831]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_sta_high

Very high

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c
And 49 other symbols [832]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — ppe_sta_vhigh

VARIABLE

`(ppe_sta_low+ppe_sta_mod+ppe_sta_high+ppe_sta_vhigh)`

LONG — sum_ppe_sta

STATIC TEXT

E `sum_ppe_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER
	ppe_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

POPULATION GROWTH RATE

E `sum_ppe_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (www.fishbase.org, (Froese and Pauly 2021))

Maximum growth rate (r_{max})	• No data/information
Von Bertalanffy K	• 0.09-0.34 (Baltic Sea)
Age at maturity (t_m)	• 3 (SH, Germany)
Maximum age (t_{max})	• No data/information
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 89.8 cm TL

Low

NUMERIC: INTEGER — ppe_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [833]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — ppe_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [834]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — ppe_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [835]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — ppe_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [836]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_ppe_pgr

`(ppe_pgr_low+ppe_pgr_mod+ppe_pgr_high+ppe_pgr_vhigh)`

STATIC TEXT

E `sum_ppe_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER ppe_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

SENSITIVITY TO OTHER STRESSORS

E `sum_ppe_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• *pH changes: Activation of pikeperch spermatozoa in water of pH 8 (Dziewulska 2020)*
• *Newly-hatched larvae threshold for survival: 4.8-5.8 pH (Vuorinen et al. 1993)*

Low

NUMERIC: INTEGER ppe_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [837]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER ppe_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [838]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER ppe_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [839]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER ppe_ost_vhigh

I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [840]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

LONG sum_ppe_ost

`(ppe_ost_low+ppe_ost_mod+ppe_ost_high+ppe_ost_vhigh)`

STATIC TEXT

E `sum_ppe_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	ppe_ost_dtq
V1 `self.InRange(0,3) || self == null`		
M1 Value must be between 0 and 3		

ZANDER - PIKEPERCH (SANDER LUCIOPERCA)

DIRECTION OF EFFECTS

E `sum_ppe_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive	NUMERIC: INTEGER	ppe_doe_pos
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
Neutral	NUMERIC: INTEGER	ppe_doe_neu
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
Negative	NUMERIC: INTEGER	ppe_doe_neg
V1 `self.InRange(0,4) || self == null`		
M1 Value must be between 0 and 4		
VARIABLE (ppe_doe_pos+ppe_doe_neu+ppe_doe_neg)	LONG	sum_ppe_doe

STATIC TEXT

E `sum_ppe_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT	ppe_com

HECHT - NORTHERN PIKE (ESOX LUCIUS)

pike

STATIC TEXT

Additional Information:

References in Population growth for eel, perch, northern pike and pike perch are indicated by color of nearby study area.

Distribution range in the Western Baltic Sea	• Baltic Proper: Along the Swedish coast (Nilsson 2006) • Coastal waters of the south-western part of the Baltic (Jacobsen et al. 2017) • Western Baltic Sea: populations are restricted to lagoons and protected fjords (Jorgensen et al. 2010)
Stock size	• Over recent decades, stocks around the Baltic Sea have declined drastically (Rohtla et al. 2012)
Recruitment	• No data/information
Growth	• Growth is impeded in brackish waters compared with fresh water (Jorgensen et al. 2010)

- Northern pike can tolerate a wide range of environmental conditions but are primarily mesothermal, or cool-water, fish best adapted to shallow (< 12 m), productive, mesotrophic-eutrophic environments (North America) (Casselman and Lewis 1996)
- It is unknown if *E. lucius* populations in the western Baltic Sea's more saline waters are dependent on access to fresh water (e.g. lakes or small streams draining into the lagoon) for spawning and egg development or if eggs and fry have developed an increased tolerance to salinity (Jorgensen et al. 2010)
- Sympatric populations of pike *Esox lucius* (Baltic Sea) (Westin and Limburg 2002)
- One population is an obligate freshwater spawner and the other not only reproduces in ambient Baltic salinities, but appears not to enter fresh water at all (Westin and Limburg 2002)

HECHT - NORTHERN PIKE (ESOX LUCIUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Freshwater-brackish environment: Spawning in streams, vegetated lakes and rivers, foraging in the Baltic Sea (Engstedt et al. 2014)
• Freshwater is an important recruitment habitat for Baltic Sea pike (Engstedt et al. 2010)
• Suitable spawning and nursery areas in shallow water: Wetlands should be shallow (0.2-1.5 m) and contain temporarily flooded terrestrial vegetation (Nilsson 2006; Nilsson et al. 2014)

Low

NUMERIC: INTEGER pik_hab_low

I Population is a habitat generalist and utilizes very common abiotic hab itats during the entire ontogeny. Occurrences of early life stages and a dults have been documented in diverse habitats. The popul

And 124 other symbols [841]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER pik_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but c an survive in other habitats (with possible impacts

And 19 other symbols [842]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER pik_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi

And 132 other symbols [843]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater [And 164 other symbols [844]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_hab_vhigh`
VARIABLE `(pik_hab_low+pik_hab_mod+pik_hab_high+pik_hab_vhigh)`	LONG `sum_pik_hab`

STATIC TEXT

E `sum_pik_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER `pik_hab_dtq`

HECHT - NORTHERN PIKE (ESOX LUCIUS)

PREY SPECIFICITY

E `sum_pik_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

- *Juveniles: Zooplankton, invertebrates (Froese and Pauly 2021)*
- *Adults: piscivorous, cannibalism is common (Froese and Pauly 2021)*
- *Adult prey in oligohaline waters: Roach, perch, ruff; in mesohaline waters: Roach, herring, perch; minor importance in Greifswald Bay are eelpout and sandeels (Winkler 1989)*

Low I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, [And 164 other symbols [845]] W1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_prey_low`
Moderate I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of [And 184 other symbols [846]] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_prey_mod`

High

I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i
And 212 other symbols [847]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — pik_prey_high

Very high

I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles
And 104 other symbols [848]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — pik_prey_vhigh

VARIABLE

`(pik_prey_low+pik_prey_mod+pik_prey_high+pik_prey_vhigh)`

LONG — sum_pik_prey

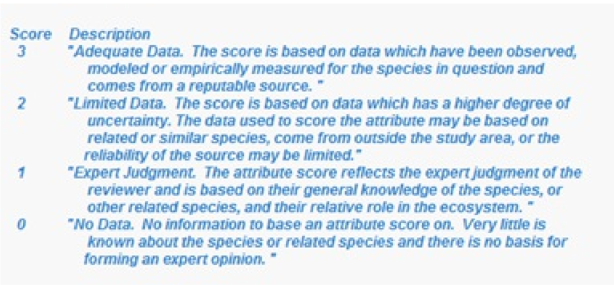
STATIC TEXT

E `sum_pik_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality



Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — pik_prey_dtq

HECHT - NORTHERN PIKE (ESOX LUCIUS)

ADULT MOBILITY

E `sum_pik_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• Show migratory behavior spawning in streams and rivers, foraging in the sea (Engstedt et al. 2014)
• Two different ecotypes: Some populations migrate from the sea into freshwater streams for spawning, whereas other populations do not display diadromy and are capable of spawning at ambient salinity (Central Baltic) (Westin and Limburg 2002)
• Some adults are non-migratory, remain in brackish lagoon (Jacobsen et al. 2017)

Low

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [849]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pik_mob_low`

Moderate

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [850]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pik_mob_mod`

High

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [851]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pik_mob_high`

Very high

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — `pik_mob_vhigh`

VARIABLE

`(pik_mob_low+pik_mob_mod+pik_mob_high+pik_mob_vhigh)`

LONG — `sum_pik_mob`

STATIC TEXT

E `sum_pik_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — `pik_mob_dtq`

HECHT - NORTHERN PIKE (ESOX LUCIUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_pik_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

- *Demersal eggs, benthic larvae in close association with substrate (Froese and Pauly 2021)*
- *Hatch in freshwater and >90% migrate to the sea at size of 60 mm (Engstedt et al. 2010)*
- *80-95% of individuals (larvae/juveniles) left wetlands within 1 month (< 69 mm) (Nilsson et al. 2014)*
- *Larvae remain near spawning site for several weeks, after dispersal to nearby areas (Raat 1988)*

Low

NUMERIC: INTEGER `pik_els_low`

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [852]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER `pik_els_mod`

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [853]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER `pik_els_high`

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [854]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER `pik_els_vhigh`

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [855]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pik_els_low+pik_els_mod+pik_els_high+pik_els_vhigh)`

LONG `sum_pik_els`

STATIC TEXT

E `sum_pik_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER `pik_els_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HECHT - NORTHERN PIKE (ESOX LUCIUS)

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_pik_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Deposited eggs are extremely vulnerable, factors such as oxygen conc., salinity, siltation and temperature (Nilsson 2006)
• Pike yolk-sac larvae: in shallow bays (depth <1.5m) with dense vegetation (Urho et al. 1990), remain attached to the vegetation by adhesive papillae for some days (Nilsson et al. 2014)
• Larvae size 11-13 mm, exogenous feeding on zooplankton (Craig 1996; Nilsson et al. 2014)
• Juveniles: Feeding areas to deeper waters (Urho et al. 1990)
• Larvae and juveniles left wetlands within one month (at size <6cm) (Nilsson et al. 2014)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [856] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_ssr_low` --------------------------------
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [857] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_ssr_mod` --------------------------------
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [858] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_ssr_high` --------------------------------
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [859] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_ssr_vhigh` --------------------------------
VARIABLE `(pik_ssr_low+pik_ssr_mod+pik_ssr_high+pik_ssr_vhigh)`	LONG `sum_pik_ssr`

STATIC TEXT

E `sum_pik_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER pik_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HECHT - NORTHERN PIKE (ESOX LUCIUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_pik_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Spawning in spring (March-June, depending on latitude) in flooded areas or wetlands within or near the coast (Engstedt et al. 2014)
• Vegetation key factor for successful reproduction (Nilsson et al. 2014)
• Populations in the Baltic Sea use two different reproductive strategies: spawning in shallow brackish waters or coastal freshwater streams (Nilsson 2006)
• Eggs are scattered in small clutches in shallow water among vegetation, sticky eggs (Nilsson et al. 2014), nonguarders (Froese and Pauly 2021)
• Spawning peaks in Swedish wetlands: 8-13° C , in brackish bay ~6-8 °C (Nilsson et al. 2014)
• Natal homing in Baltic Sea (Engstedt et al. 2014)

Low

NUMERIC: INTEGER pik_crs_low

I Simple reproductive strategy. Population contains no more than one c haracteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER pik_crs_mod

I Slight complexity. Population has two characteristics that suggest com plexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER pik_crs_high

I Complex reproductive strategy. Population has three characteristics th at suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER pik_crs_vhigh

I Very complex reproductive strategy. Population has four or more char acteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (pik_crs_low+pik_crs_mod+pik_crs_high+pik_crs_vhigh)	LONG	sum_pik_crs

STATIC TEXT

E `sum_pik_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — pik_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HECHT - NORTHERN PIKE (ESOX LUCIUS)

POPULATION SPAWNING CYCLE

E `sum_pik_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

- *Spawning in spring (March-June, depending on latitude) (Engstedt et al. 2014)*
- *Spawning frequency: One clear seasonal peak per year (Froese and Pauly 2021)*

Low — NUMERIC: INTEGER — pik_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [860]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — pik_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [861]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High — NUMERIC: INTEGER — pik_spw_high

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [862]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER pik_spw_vhigh

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [863]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pik_spw_low+pik_spw_mod+pik_spw_high+pik_spw_vhigh)`

LONG sum_pik_spw

STATIC TEXT

E `sum_pik_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER pik_spw_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

HECHT - NORTHERN PIKE (ESOX LUCIUS)

SENSITIVITY TO INCREASING TEMPERATURE

E `sum_pik_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

• Growth of larvae was maximum at 26°C and negligible below 7 °C (Hokanson et al. 1973)
• Lethal temperatures from 29-35°C, physiological optimum, 20-28°C (Hokanson 1977)
• Fertilization and hatching rates and quality of larvae indicates that the optimal temperature for successful incubation and production of high quality larvae is in the range of 6–10°C (Bondarenko et al. 2015)
• Effects of temperature differed among families within both populations, population-specific responses to temperature indicate genetic differentiation in developmental plasticity between populations (Sunde et al. 2019)

Low

NUMERIC: INTEGER pik_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [864]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate I Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperat And 336 other symbols [865] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pik_stt_mod -
High I Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning te And 400 other symbols [866] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pik_stt_high -
Very high I Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [867] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER pik_stt_vhigh -
VARIABLE `(pik_stt_low+pik_stt_mod+pik_stt_high+pik_stt_vhigh)`	LONG sum_pik_stt

STATIC TEXT

E `sum_pik_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
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0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER pik_stt_dtq -

HECHT - NORTHERN PIKE (ESOX LUCIUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_pik_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

- *Stenohaline species known to tolerate salinities up to 15 psu (Jørgensen et al. 2010; Raat 1988)*
- *Pike is also found in coastal waters of the southwestern part of the Baltic, where salinities are 10–12 psu (temporarily up to 14–15 psu) (Jacobsen et al. 2017)*
- *Pike in the western Baltic Sea live on the edge of their salinity tolerance (Jacobsen et al. 2017)*

• *Salinity tolerance varies during different life stages (Jørgensen et al. 2010)*
• *Previous studies suggest that freshwater spawning pike are unable to produce offspring in brackish waters over 7 psu, brackish spawning population seems to have lost its ability to spawn in freshwater (Jørgensen et al. 2010; Raat 1988)*
• *Migrating to freshwater from a gradient of 7 psu (south-east) to 10-25 psu in the Kattegat/Skagerrak (Engstedt et al. 2014)*
• *Fry exhibited stress behavior and reduced growth at salinities above 13 psu (Jørgensen et al. 2010)*
• *Population naturally spawning in the stable freshwater habitat showed signs of specialization for freshwater spawning, population exposed to fluctuating selective pressure in a spawning area with occasional brackish water intrusions tolerated higher salinities and displayed considerable variation in reaction norms (Sunde et al. 2018)*

Low

NUMERIC: INTEGER — pik_sts_low

I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — pik_sts_mod

I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne
And 3 other symbols [868]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — pik_sts_high

I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r
And 27 other symbols [869]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — pik_sts_vhigh

I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if
And 28 other symbols [870]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(pik_sts_low+pik_sts_mod+pik_sts_high+pik_sts_vhigh)`

LONG — sum_pik_sts

STATIC TEXT

E `sum_pik_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

NUMERIC: INTEGER — pik_sts_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_pik_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect And 118 other symbols [871] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_sta_low` _ .
Moderate I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when And 127 other symbols [872] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_sta_mod` _ .
High I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi And 118 other symbols [873] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_sta_high` _ .
Very high I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c And 49 other symbols [874] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER `pik_sta_vhigh` _ .
VARIABLE `(pik_sta_low+pik_sta_mod+pik_sta_high+pik_sta_vhigh)`	LONG `sum_pik_sta`

STATIC TEXT

E `sum_pik_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:	NUMERIC: INTEGER	pik_sta_dtq
V1 `self.InRange(0,3) || self == null`		
M1 Value must be between 0 and 3		

HECHT - NORTHERN PIKE (ESOX LUCIUS)

POPULATION GROWTH RATE

E `sum_pik_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (www.fishbase.org, (Froese and Pauly 2021)

Maximum growth rate (r_{max})	• No data/information
Von Bertalanffy K	• 0.17-0.27 (Lakes in Finland, Poland)
Age at maturity (t_m)	• 2-3 (UK, North Sea)
Maximum age (t_{max})	• 12 (Lake in Lithuania)
Natural mortality (M)	• 0.24-0.46 (UK, North Sea)
Maximum length (L_{inf})	• 97.5 cm TL

Low

NUMERIC: INTEGER — pik_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
[And 30 other symbols [875]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — pik_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
[And 60 other symbols [876]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — pik_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
[And 88 other symbols [877]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — pik_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
[And 79 other symbols [878]]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE — LONG — sum_pik_pgr

`(pik_pgr_low+pik_pgr_mod+pik_pgr_high+pik_pgr_vhigh)`

STATIC TEXT

E `sum_pik_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER pik_pgr_dtq

V1 self.InRange(0,3) || self == null

M1 Value must be between 0 and 3

HECHT - NORTHERN PIKE (ESOX LUCIUS)

SENSITIVITY TO OTHER STRESSORS

E sum_pik_pgr == 5

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Eutrophication, climate change and overfishing are thought to be the reason for dramatic decline in populations (Rohtla et al. 2012)
• Predation possible cause of poor recruitment in Kalmar Sound region, many pike eggs were lost to the three-spine stickleback (Baltic Sea) (Nilsson 2006)
• pH: Newly hatched pike larvae: mortality was 17% (pH 6.8), 26% (pH 5.0), 97% (pH 4.2) (Johansson and Kihlström 1975)
• Oxygen: 50% oxygen saturation was sufficient for survival and development of eggs and larvae (15°C, 19°C, velocities about 3.3-1.6 cm/min) (Siefert et al. 1973)

Low

NUMERIC: INTEGER pik_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox
And 323 other symbols [879]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER pik_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [880]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER pik_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,
And 321 other symbols [881]

V1 self.InRange(0,5) || self == null

M1 Value must be between 0 and 5

Very high

I Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, preda
And 315 other symbols [882]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER pik_ost_vhigh

VARIABLE

`(pik_ost_low+pik_ost_mod+pik_ost_high+pik_ost_vhigh)`

LONG sum_pik_ost

STATIC TEXT

E `sum_pik_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER pik_ost_dtq

HECHT - NORTHERN PIKE (ESOX LUCIUS)

DIRECTION OF EFFECTS

E `sum_pik_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER pik_doe_pos

Neutral

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER pik_doe_neu

Negative

V1 `self.InRange(0,4) || self == null`

M1 Value must be between 0 and 4

NUMERIC: INTEGER pik_doe_neg

VARIABLE

`(pik_doe_pos+pik_doe_neu+pik_doe_neg)`

LONG sum_pik_doe

STATIC TEXT

E `sum_pik_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT pik_com

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

eelpout

STATIC TEXT

Additional Information:

Distribution range in the Western Baltic Sea	• Abundant in the Kattegat and northeastern Baltic Sea (Heessen et al. 2015) • Gulf of Finland, Gulf of Riga, Baltic Proper (Ojaveer et al. 2004) • Western Baltic Sea (German coastal areas) (Gercken et al. 2006)
Stock size	• No data/information
Recruitment	• No data/information
Growth	• Eelpout growth rate differed between the studied sites, most likely as a result of differing environmental conditions (Bergek et al. 2012)

- Maximum growth performance in the Baltic Sea suggest that this environment is suitable to maintain highly productive eelpout populations, however, only if spring/summer temperatures remain below the upper thermal limits (Pörtner et al. 2001)
- Adaptation of the originally cold stenotherm eelpout enabled the fish to occupy the more productive eurytherm biotope and thus facilitated an increase in the abundance of the species (Ojaveer et al. 2004)
- Eelpout is a bio-indicator species for monitoring pollutant effects in marine coastal waters (Napierska and Podolska 2006), also for climate change (Expert information)
- Important FFH-species (Expert information)

STATIC TEXT

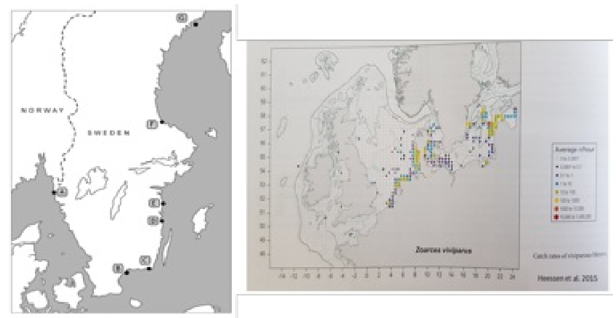

Fig. 1. The sampling sites in the Baltic Sea and the Skagerrak. A = Fjällbacka, B = Kladdenabb, C = Torhamn, D = Marsö, E = Kvädöfjärden, F = Gävlebukten, G = Holmöarna.

(Vetemaa et al. 2006)

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

HABITAT SPECIFICITY

STATIC TEXT

Determine the relative dependence of a population to a habitat and the abundance of key habitats.

STATIC TEXT

• Sedentary species, inhabiting rocky shores under stones, among algae and in tide pools (www.fishbase.org, Froese and Pauly 2021)
• Habitat preferences: Stones and algae (Expert information)
• Inhabiting both shallow and deep areas (Ojaveer et al. 2004)
• Gulf of Riga: two ecological groups: cold deep water (below 20 m) and in the shallow coastal zone (1-2 m) (Baltic Sea) (Kreitsberg et al. 2012)

Low

NUMERIC: INTEGER

eep_hab_low

I Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The popul
And 124 other symbols [883]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER

eep_hab_mod

I Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts
And 19 other symbols [884]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER eep_hab_high

I Population is a specialist on an abundant habitat. The population or on e life stage is a specialist that is restricted to a specific, but common h abitat (e.g. sandy bottoms, freshwater streams). Consi

And 132 other symbols [885]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER eep_hab_vhigh

I Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habit at (e.g. seagrass beds, gravel beds in freshwater

And 164 other symbols [886]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eep_hab_low+eep_hab_mod+eep_hab_high+eep_hab_vhigh)`

LONG sum_eep_hab

STATIC TEXT

E `sum_eep_hab != 5`

The attribute habitat specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER eep_hab_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

PREY SPECIFICITY

E `sum_eep_hab == 5`

STATIC TEXT

Determine is the population a prey generalist or a prey specialist.

STATIC TEXT

• Differences according to different biotopes (eurytherm/cold stenotherm)
• Benthic isopod crustaceans, amphipods (cold stenotherm), more diverse for the eurytherm biotope with invertebrates (mainly Macoma balthica), crustaceans and fish (herring, smelt, cyprinids) (Ojaveer et al. 2004)

Low

NUMERIC: INTEGER eep_prey_low

I Population eats a large variety of prey (opportunistic feeder). Populatio n is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores,

And 164 other symbols [887]

W1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate	NUMERIC: INTEGER	eep_prey_mod
I Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of pre y species, but is more restricted to a limited number of And 184 other symbols [888] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

High	NUMERIC: INTEGER	eep_prey_high
I Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. Th e stock is able to switch to a different prey type i And 212 other symbols [889] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

Very high	NUMERIC: INTEGER	eep_prey_vhigh
I Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles And 104 other symbols [890] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	________________________________	

VARIABLE	LONG	sum_eep_prey
`(eep_prey_low+eep_prey_mod+eep_prey_high+eep_prey_vhigh)`		

STATIC TEXT

E `sum_eep_prey != 5`

The attribute prey specificity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score:	NUMERIC: INTEGER	eep_prey_dtq
V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	________________________________	

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

ADULT MOBILITY

E `sum_eep_prey == 5`

STATIC TEXT

Determine the ability of the population to move if their current location becomes unsuitable (homing behavior excluded).

STATIC TEXT

• *Non-migrating, stationary (Baltic Sea) (Napierska and Podolska 2006; Pörtner et al. 2001) to limited migration (20-50 km) (Ojaveer et al. 2004)*

Low

NUMERIC: INTEGER — `eep_mob_low`

I Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new ha bitats in order to maintain preferred environmental condition
And 2 other symbols [891]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `eep_mob_mod`

I Highly mobile and site dependent adults. Adults are mobile with site-d ependency. Adult fish has the capacity to move from one site to anothe r if necessary or have the potential to move to other habita
And 59 other symbols [892]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `eep_mob_high`

I Site dependent with limited mobility. Adults are site-dependent and res tricted in their movement by environmental or behavioral barriers (wo n't swim across open ocean). Adult fish has limited capacity
And 122 other symbols [893]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `eep_mob_vhigh`

I Non-mobile. Adult are stationary and unable to move to other habitats in order to maintain preferred environmental conditions and are highly vulnerable to climate-induced environmental changes.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eep_mob_low+eep_mob_mod+eep_mob_high+eep_mob_vhigh)`

LONG — `sum_eep_mob`

STATIC TEXT

E `sum_eep_mob != 5`

The attribute adult mobility must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — `eep_mob_dtq`

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

DISPERSAL OF EARLY LIFE STAGES

E `sum_eep_mob == 5`

STATIC TEXT

Estimate the ability of the population to colonize new habitats.

STATIC TEXT

• Life bearing, no dispersal of eggs; embryos remain in the ovary 3-4 months after hatching from the egg membranes (citations in Vetemaa et al. 2006)
• Young eelpouts are released in Jan-March (Southern Baltic Sea) (Napierska and Podolska 2006)

Low

NUMERIC: INTEGER — eep_els_low

I Highly dispersed eggs and larvae. Planktonic eggs and larvae are disp ersed > 100 km from spawning location. Eggs/larvae show a high dispe rsal capacity with the ability to colonize potential new habita
And 39 other symbols [894]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eep_els_mod

I Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a mo derate dispersal capacity with a moderate ability to colonize pot
And 56 other symbols [895]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — eep_els_high

I Low dispersal of eggs and larvae Planktonic eggs and larvae are typica lly found over the same location as parents. Eggs/larvae show a low di spersal capacity with a low ability to colonize potential ne
And 47 other symbols [896]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — eep_els_vhigh

I No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specif ic substrates) or little to no planktonic early life stages (e.g. benthic lar vae) show no dispersal capacity and ability to coloni
And 93 other symbols [897]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eep_els_low+eep_els_mod+eep_els_high+eep_els_vhigh)`

LONG — sum_eep_els

STATIC TEXT

E `sum_eep_els != 5`

The attribute dispersal of early life stages must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — eep_els_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS

E `sum_eep_els == 5`

STATIC TEXT

Determine the relative importance of early life history requirements for the population.

STATIC TEXT

• Internal fertilization takes place at the end of summer (June-August) (Southern Baltic Sea) (Napierska and Podolska 2006)
• Development time: 2-3 weeks (Heessen et al. 2015)
• After hatching inside the ovary, a 4–5-month development time follows, during which the larvae are dependent on the transfer of maternal nutrients (Vetemaa et al. 2006)
• Young eelpouts are released in Jan-March (Southern Baltic Sea) (Napierska and Podolska 2006)

Low I Egg and larvae have minimal requirements. Population has general re quirements for the egg and larval stage that are relatively resilient to e nvironmental change. Eggs and larvae are not dependent on s And 245 other symbols [898] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_ssr_low _________________________________.
Moderate I Egg and larvae have minimal requirements or requirements are unkno wn but recruitment is relatively stable. Population requirements for eg g and larval stage are not well understood but recruitment is r And 365 other symbols [899] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_ssr_mod _________________________________.
High I Eggs and larvae have some specific requirements. Population require ments for the egg and larval stage are not well understood, but recruit ment is highly variable and appears to have a strong dependenc And 310 other symbols [900] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_ssr_high _________________________________.
Very high I Eggs and larvae have multiple specific requirements. Population has s pecific known biological and physical requirements for egg and larval s urvival. Eggs and larvae are highly dependent on specific bi And 236 other symbols [901] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_ssr_vhigh _________________________________.
VARIABLE `(eep_ssr_low+eep_ssr_mod+eep_ssr_high+eep_ssr_vhigh)`	LONG sum_eep_ssr

STATIC TEXT

E `sum_eep_ssr != 5`

The attribute early life history survival and settlement requirements must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: NUMERIC: INTEGER eep_ssr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

COMPLEXITY IN REPRODUCTIVE STRATEGY

E `sum_eep_ssr == 5`

STATIC TEXT

Identify reproductive strategy that may be disrupted by climate change and how dependent reproductive success is on specific conditions.
Reproductive characteristics are (e.g.): Diadromous migration, parental care/guarding nest behavior, homing behavior, utilization on specific habitats for spawning or rearing early life stages (e.g. vegetated areas), temperature effects (e.g. on gonad development or initial spawning).

STATIC TEXT

• Viviparous (Ojaveer et al. 2004)
• Internal fertilization takes place at the end of summer (Southern Baltic Sea) (Napierska and Podolska 2006)
• Oocytes are fertilized immediately after ovulation in late summer, followed by 3 weeks of embryological development (Baltic Sea) (Vetemaa et al. 2006)
• Maturation of eelpout from the southern Baltic begins and ends later in the year than does that of fish from the western European coast (e.g., North Sea) (Napierska and Podolska 2006)
• Number of hatched embryos per female varies from less than 10 and more than 150, depending upon the size of the female (Napierska and Podolska 2006)
• After hatching inside the ovary, a 4–5-month development time follows, during which the larvae are dependent on the transfer of maternal nutrients (Vetemaa et al. 2006)

Low NUMERIC: INTEGER eep_crs_low

I Simple reproductive strategy. Population contains no more than one characteristic that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate NUMERIC: INTEGER eep_crs_mod

I Slight complexity. Population has two characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High NUMERIC: INTEGER eep_crs_high

I Complex reproductive strategy. Population has three characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high NUMERIC: INTEGER eep_crs_vhigh

I Very complex reproductive strategy. Population has four or more characteristics that suggest complexity in reproductive strategy.

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE (eep_crs_low+eep_crs_mod+eep_crs_high+eep_crs_vhigh)	LONG	sum_eep_crs

STATIC TEXT

E `sum_eep_crs != 5`

The attribute complexity in reproductive strategy must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: — NUMERIC: INTEGER — eep_crs_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

POPULATION SPAWNING CYCLE

E `sum_eep_crs == 5`

STATIC TEXT

Identify spawning strategies that are more sensitive to changes (focus on the dominant population within the system). Morrison et al. 2015: "We are describing the spawning activity of the entire stock, not the individual. In other words, we are interested in the time from when spawning commences until when it ends, not how long a single individual spawns."

STATIC TEXT

• Internal fertilization takes place at the end of summer (June-August) (Southern Baltic Sea) (Napierska and Podolska 2006)
• April-May (North Sea) (Napierska and Podolska 2006)

Low — NUMERIC: INTEGER — eep_spw_low

I Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a def ined “spawning season” is less likely to suffer spawning failur
And 49 other symbols [902]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate — NUMERIC: INTEGER — eep_spw_mod

I Several spawning events throughout the year (across more than one s eason). Population that spawns several times per year and spawns acr oss more than one season has a moderate likelihood of spawning su
And 105 other symbols [903]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

I One spawning event per year within a confined time frame (over a peri od of less than 3 months/one season (e.g. spring spawners). Populatio n that spawn once a year (with spawning waves) and all spawnin
And 204 other symbols [904]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eep_spw_high

Very high

I One spawning event per year over a brief period of time. Population th at requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likeli
And 134 other symbols [905]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

NUMERIC: INTEGER — eep_spw_vhigh

VARIABLE
`(eep_spw_low+eep_spw_mod+eep_spw_high+eep_spw_vhigh)`

LONG — sum_eep_spw

STATIC TEXT

E `sum_eep_spw != 5`

The attribute spawning cycle must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

NUMERIC: INTEGER — eep_spw_dtq

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)
SENSITIVITY TO INCREASING TEMPERATURE

E `sum_eep_spw == 5`

STATIC TEXT

Known temperature of occurrence or the distribution of the species as a proxy for sensitivity to temperature.

STATIC TEXT

- *Distinct relationship between hot summer events and low abundance in following year (North Sea) (Pörtner et al. 2001)*
- *“Sleeping in summer” when temperatures are too high (reduced metabolism) (Expert information)*
- *Global warming would thus be likely to cause a shift in the distribution of this species to the North (Zakhartsev et al. 2003)*
- *Optimal temperature: 3°C reflects winter period, 12°C for somatic growth (Zakhartsev et al. 2003)*
- *Upper lethal temperature: 22-23°C (Zakhartsev et al. 2003)*
- *Sub-critical temperature is about 13-15°C, above 18°C lower survival (Zakhartsev et al. 2003)*

Low

NUMERIC: INTEGER — eep_stt_low

I Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spaw ning phenology. Population occurs across a wide range of temperature s And 326 other symbols [906]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — eep_stt_mod

I Moderate temperature range throughout ontogeny and adapted to wa rmer water temperatures. Changes in temperature have moderate im pact on spawning phenology. Population occurs across a moderate te mperat And 336 other symbols [907]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — eep_stt_high

I Somewhat limited temperature range throughout ontogeny and adapt ed to colder water temperatures. Changes in temperature have moder ate/high impact on spawning phenology (due to moderate/low spawnin g te And 400 other symbols [908]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — eep_stt_vhigh

I Very limited temperature range throughout ontogeny and well adapte d to colder water temperatures. Changes in temperature have high im pact on spawning phenology (due to low temperature threshold for sp And 341 other symbols [909]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eep_stt_low+eep_stt_mod+eep_stt_high+eep_stt_vhigh)`

LONG — sum_eep_stt

STATIC TEXT

E `sum_eep_stt != 5`

The attribute sensitivity to temperature must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER — eep_stt_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

SENSITIVITY TO DECREASING SALINITY

E `sum_eep_stt == 5`

STATIC TEXT

Known salinity tolerance or the distribution of the species as a proxy for sensitivity to salinity.

STATIC TEXT

• Euryhaline and thus tolerates the brackish water conditions of the Baltic Sea (Gercken et al. 2006)
• Skagerrak population, which is the most saline environment, showed a much faster growth rate than the other Baltic Sea populations (slowest growth rate at lowest salinity levels Golf of Finland and Golf of Bothnia (Bergek et al. 2012)

Low I Euryhaline/life stages occurring in the Baltic Sea are euryhaline. Popul ation is able to adapt over a wide salinity range without consequences on reproduction or fitness. V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_sts_low
Moderate I Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Pop ulation is able to adapt over a certain range of brackish water (5-18, Fi shbase.org) without consequences on reproduction or fitne And 3 other symbols [910] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_sts_mod
High I Limited salinity range/life stages occurring in the Baltic Sea show a limi ted salinity range. Population is able to tolerate a certain range of brac kish water (5-18, Fishbase.org) with limitation on r And 27 other symbols [911] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_sts_high
Very high I Stenohaline/critical life stages (if resident in Baltic Sea) are stenohalin e. No/very little tolerance to changes in salinity throughout ontogeny, c onsider temporal stenohaline critical life stages if And 28 other symbols [912] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_sts_vhigh
VARIABLE `(eep_sts_low+eep_sts_mod+eep_sts_high+eep_sts_vhigh)`	LONG sum_eep_sts

STATIC TEXT

E `sum_eep_sts != 5`

The attribute sensitivity to salinity must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER eep_sts_dtq

SENSITIVITY TO OCEAN ACIDIFICATION (PH)

E `sum_eep_sts == 5`

STATIC TEXT

Determine the sensitivity or tolerance against decreased pH (relationship to "sensitive taxa").

STATIC TEXT

• No data/information

Low

NUMERIC: INTEGER — `eep_sta_low`

I Population either does not rely on pH sensitive taxa (for food), or is exp ected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expect

And 118 other symbols [913]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER — `eep_sta_mod`

I Population is somewhat reliant on sensitive taxa and/or at certain life s tages susceptible to pH decrease. The population utilizes sensitive tax a (for food), but can switch to non-sensitive taxa when

And 127 other symbols [914]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER — `eep_sta_high`

I Population is reliant on sensitive taxa and/or certain life stage is negati vely affect by a decrease in pH. The population is dependent on sensiti ve taxa (for food) (i.e., cannot switch to a non-sensi

And 118 other symbols [915]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER — `eep_sta_vhigh`

I Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider t he impact on development of sensitive life stages, c

And 49 other symbols [916]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

`(eep_sta_low+eep_sta_mod+eep_sta_high+eep_sta_vhigh)`

LONG — `sum_eep_sta`

STATIC TEXT

E `sum_eep_sta != 5`

The attribute sensitivity to ocean acidification (pH) must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER eep_sta_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

POPULATION GROWTH RATE

E `sum_eep_sta == 5`

STATIC TEXT

Estimate the Productivity of the population.

STATIC TEXT

- (www.fishbase.org, (Froese and Pauly 2021)

Maximum growth rate (r_{max})	• Intrinsic population growth rate: 1.13 (Baltic Sea) (Bergek et al. 2012)
Von Bertalanffy K	• 0.37-0.42 (Western Baltic Sea)
Age at maturity (t_m)	• Females: 1-2; males 1 (Baltic Sea) (citation in Bergek et al. 2012)
Maximum age (t_{max})	• 8 (Northern Baltic Sea)
Natural mortality (M)	• No data/information
Maximum length (L_{inf})	• 34.5 cm TL

Low

NUMERIC: INTEGER eep_pgr_low

I Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximu m age < 10 yrs Natural mortality (M) > 0.50 Measured maximum
And 30 other symbols [917]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER eep_pgr_mod

I Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at matu rity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.
And 60 other symbols [918]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER eep_pgr_high

I Population growth rate is low, low productivity, affected to any environ mental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanf fy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25
And 88 other symbols [919]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high

NUMERIC: INTEGER eep_pgr_vhigh

I Population growth rate is very low, low productivity: highly affected to a ny environmental changes Maximum growth rate (rmax) < 0.05 von Be rtalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25
And 79 other symbols [920]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

VARIABLE

LONG sum_eep_pgr

`(eep_pgr_low+eep_pgr_mod+eep_pgr_high+eep_pgr_vhigh)`

STATIC TEXT

E `sum_eep_pgr != 5`

The attribute population growth rate must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source."
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem."
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion."

Data Quality Score:

NUMERIC: INTEGER eep_pgr_dtq

V1 `self.InRange(0,3) || self == null`

M1 Value must be between 0 and 3

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

SENSITIVITY TO OTHER STRESSORS

E `sum_eep_pgr == 5`

STATIC TEXT

To account for other factors that could limit population responses to climate change.

STATIC TEXT

• Chemicals have been observed to increase ovarian atresia in fish species (Bergek et al. 2012), although it is not clear whether environmental pollution and toxic substances lead to increased atresia in the eelpout
• Increasing concentration in contaminants (mercury, PCB) in eelpout, increase coincided with the introduction of an invasive deep-burrowing polychaete, contributed the release of contaminants through bioturbation (Baltic Sea) (Hanson et al. 2020)
• Impaired larval development was associated with the state of environmental pollution (Gercken et al. 2006)
• Reproductive performance significantly reduced in female blenny exposed to petrochemical effluents, larval growth significantly lowered, and the proportion of females carrying dead juveniles was higher than at the reference site (North Sea) (Vetemaa et al. 1997)
• mean number of dead juveniles per female was significantly higher in the effluent area (Vetemaa et al. 1997)
• Well adapted to environmental short-term hypoxia, are able to survive under anoxic conditions for 1 h; ability to reduce activity and respiration at a very early phase of oxygen depletion and rests motionless on the bottom (Fischer et al. 1992)

Low

NUMERIC: INTEGER eep_ost_low

I Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known st ressor. Additional stressors are e.g. sensitivity to low ox

And 323 other symbols [921]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Moderate

NUMERIC: INTEGER eep_ost_mod

I Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stresso rs. Additional stressors are e.g. sensitivity to low oxygen,

And 321 other symbols [922]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

High

NUMERIC: INTEGER eep_ost_high

I Population is experiencing moderate/high stress (other than fishing pr essure). Population is experiencing no more than three known stressor s. Additional stressors are e.g. sensitivity to low oxygen,

And 321 other symbols [923]

V1 `self.InRange(0,5) || self == null`

M1 Value must be between 0 and 5

Very high I Population is experiencing high/very high stress (other than fishing pre ssure). Population is experiencing four or more known stressors. Additi onal stressors are e.g. sensitivity to low oxygen, preda And 315 other symbols [924] V1 `self.InRange(0,5) || self == null` M1 Value must be between 0 and 5	NUMERIC: INTEGER eep_ost_vhigh ________________________________
VARIABLE `(eep_ost_low+eep_ost_mod+eep_ost_high+eep_ost_vhigh)`	LONG sum_eep_ost

STATIC TEXT

E `sum_eep_ost != 5`

The attribute other stressors must have a sum of 5

STATIC TEXT

Data Quality

Score	Description
3	"Adequate Data. The score is based on data which have been observed, modeled or empirically measured for the species in question and comes from a reputable source. "
2	"Limited Data. The score is based on data which has a higher degree of uncertainty. The data used to score the attribute may be based on related or similar species, come from outside the study area, or the reliability of the source may be limited."
1	"Expert Judgment. The attribute score reflects the expert judgment of the reviewer and is based on their general knowledge of the species, or other related species, and their relative role in the ecosystem. "
0	"No Data. No information to base an attribute score on. Very little is known about the species or related species and there is no basis for forming an expert opinion. "

Data Quality Score: V1 `self.InRange(0,3) || self == null` M1 Value must be between 0 and 3	NUMERIC: INTEGER eep_ost_dtq ________________________________

AALMUTTER - EELPOUT (ZOARCES VIVIPARUS)

DIRECTION OF EFFECTS

E `sum_eep_pgr == 5`

STATIC TEXT

Please estimate the directional effect (positive, neutral, negative) of a changing climate on this species in the Western Baltic Sea.
Here you have 4 tallies to distribute.

Positive V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER eep_doe_pos ________________________________
Neutral V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER eep_doe_neu ________________________________
Negative V1 `self.InRange(0,4) || self == null` M1 Value must be between 0 and 4	NUMERIC: INTEGER eep_doe_neg ________________________________
VARIABLE `(eep_doe_pos+eep_doe_neu+eep_doe_neg)`	LONG sum_eep_doe

STATIC TEXT

E `sum_eep_doe != 4`

The attribute direction of change must have a sum of 4

Comments:	TEXT eep_com

FINAL COMMENTS

Last comments, feedback or ideas:	TEXT	fin_com

THANKS

final

E sum_eep_doe == 5

APPENDIX A — INSTRUCTIONS

[1] cod_hab_low: Low
Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[2] cod_hab_mod: Moderate
Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[3] cod_hab_high: High
Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[4] cod_hab_vhigh: Very high
Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[5] cod_prey_low: Low
Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[6] cod_prey_mod: Moderate
Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[7] cod_prey_high: High
Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[8] cod_prey_vhigh: Very high
Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[9] cod_mob_low: Low
Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[10] cod_mob_mod: Moderate
Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[11] cod_mob_high: High
Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[12] cod_els_low: Low
Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[13] cod_els_mod: Moderate
Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[14] cod_els_high: High
Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[15] cod_els_vhigh: Very high
No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[16] cod_ssr_low: Low
Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[17] cod_ssr_mod: Moderate
Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are

(to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[18] cod_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[19] cod_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[20] cod_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[21] cod_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[22] cod_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[23] cod_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[24] cod_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[25] cod_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[26] cod_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[27] cod_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[28] cod_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[29] cod_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[30] cod_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[31] cod_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[32] cod_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[33] cod_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[34] cod_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[35] cod_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[36] cod_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[37] cod_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[38] cod_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[39] cod_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[40] cod_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[41] cod_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[42] cod_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[43] her_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[44] her_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[45] her_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[46] her_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[47] her_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[48] her_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[49] her_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[50] her_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[51] her_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[52] her_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[53] her_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[54] her_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[55] her_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[56] her_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[57] her_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[58] her_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[59] her_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[60] her_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[61] her_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[62] her_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[63] her_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[64] her_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[65] her_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[66] her_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[67] her_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[68] her_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[69] her_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[70] her_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[71] her_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[72] her_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[73] her_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[74] her_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[75] her_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[76] her_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[77] her_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[78] her_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[79] her_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[80] her_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[81] her_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[82] her_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[83] her_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[84] her_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[85] spr_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[86] spr_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[87] spr_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[88] spr_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[89] spr_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[90] spr_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[91] spr_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[92] spr_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[93] spr_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[94] spr_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[95] spr_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[96] spr_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[97] spr_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[98] spr_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[99] spr_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[100] spr_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[101] spr_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[102] spr_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[103] spr_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[104] spr_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[105] spr_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[106] spr_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[107] spr_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[108] spr_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[109] spr_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[110] spr_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[111] spr_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[112] spr_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[113] spr_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[114] spr_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[115] spr_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[116] spr_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[117] spr_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[118] spr_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[119] spr_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[120] spr_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[121] spr_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[122] spr_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[123] spr_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[124] spr_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[125] spr_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[126] spr_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[127] mak_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[128] mak_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[129] mak_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[130] mak_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[131] mak_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[132] mak_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[133] mak_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[134] mak_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[135] mak_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[136] mak_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[137] mak_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[138] mak_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[139] mak_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[140] mak_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[141] mak_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[142] mak_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[143] mak_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[144] mak_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[145] mak_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[146] mak_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[147] mak_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[148] mak_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[149] mak_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[150] mak_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[151] mak_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[152] mak_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[153] mak_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[154] mak_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[155] mak_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[156] mak_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[157] mak_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[158] mak_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[159] mak_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[160] mak_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[161] mak_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[162] mak_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[163] mak_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[164] mak_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[165] mak_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[166] mak_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[167] mak_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[168] mak_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[169] whi_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[170] whi_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[171] whi_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[172] whi_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[173] whi_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[174] whi_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[175] whi_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[176] whi_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[177] whi_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[178] whi_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[179] whi_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[180] whi_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[181] whi_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[182] whi_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[183] whi_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[184] whi_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[185] whi_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[186] whi_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[187] whi_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[188] whi_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[189] whi_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[190] whi_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[191] whi_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[192] whi_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[193] whi_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[194] whi_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[195] whi_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[196] whi_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[197] whi_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[198] whi_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[199] whi_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[200] whi_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[201] whi_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[202] whi_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[203] whi_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[204] whi_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[205] whi_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[206] whi_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[207] whi_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[208] whi_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[209] whi_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[210] whi_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[211] tur_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[212] tur_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[213] tur_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[214] tur_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[215] tur_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[216] tur_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[217] tur_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[218] tur_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[219] tur_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[220] tur_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[221] tur_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[222] tur_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[223] tur_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[224] tur_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[225] tur_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[226] tur_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[227] tur_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[228] tur_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[229] tur_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[230] tur_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[231] tur_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[232] tur_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[233] tur_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[234] tur_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[235] tur_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[236] tur_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[237] tur_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[238] tur_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[239] tur_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[240] tur_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[241] tur_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[242] tur_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[243] tur_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[244] tur_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[245] tur_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[246] tur_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[247] tur_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[248] tur_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[249] tur_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[250] tur_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[251] tur_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[252] tur_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[253] bri_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[254] bri_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[255] bri_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[256] bri_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[257] bri_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[258] bri_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[259] bri_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[260] bri_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[261] bri_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[262] bri_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[263] bri_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[264] bri_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[265] bri_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[266] bri_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[267] bri_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[268] bri_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[269] bri_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[270] bri_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[271] bri_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[272] bri_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[273] bri_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[274] bri_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[275] bri_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[276] bri_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[277] bri_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[278] bri_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[279] bri_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[280] bri_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[281] bri_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[282] bri_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[283] bri_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[284] bri_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[285] bri_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[286] bri_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[287] bri_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[288] bri_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[289] bri_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[290] bri_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[291] bri_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[292] bri_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[293] bri_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[294] bri_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[295] dab_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[296] dab_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[297] dab_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[298] dab_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[299] dab_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[300] dab_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[301] dab_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[302] dab_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[303] dab_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[304] dab_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[305] dab_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[306] dab_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[307] dab_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[308] dab_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[309] dab_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[310] dab_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[311] dab_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[312] dab_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[313] dab_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[314] dab_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[315] dab_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[316] dab_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[317] dab_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[318] dab_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[319] dab_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[320] dab_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[321] dab_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[322] dab_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[323] dab_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[324] dab_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[325] dab_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[326] dab_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[327] dab_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[328] dab_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[329] dab_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[330] dab_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[331] dab_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[332] dab_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[333] dab_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[334] dab_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[335] dab_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[336] dab_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[337] flo_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[338] flo_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[339] flo_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[340] flo_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[341] flo_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[342] flo_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[343] flo_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[344] flo_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[345] flo_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[346] flo_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[347] flo_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[348] flo_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[349] flo_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[350] flo_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[351] flo_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[352] flo_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[353] flo_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[354] flo_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[355] flo_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[356] flo_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[357] flo_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[358] flo_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[359] flo_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[360] flo_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[361] flo_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[362] flo_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[363] flo_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[364] flo_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[365] flo_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[366] flo_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[367] flo_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[368] flo_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[369] flo_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[370] flo_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[371] flo_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[372] flo_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[373] flo_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[374] flo_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[375] flo_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[376] flo_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[377] flo_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[378] flo_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[379] pla_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[380] pla_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[381] pla_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[382] pla_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[383] pla_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[384] pla_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[385] pla_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[386] pla_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[387] pla_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[388] pla_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[389] pla_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[390] pla_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[391] pla_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[392] pla_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[393] pla_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[394] pla_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[395] pla_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[396] pla_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[397] pla_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[398] pla_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[399] pla_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[400] pla_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[401] pla_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[402] pla_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[403] pla_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[404] pla_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[405] pla_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[406] pla_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[407] pla_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[408] pla_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[409] pla_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[410] pla_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[411] pla_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[412] pla_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[413] pla_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[414] pla_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[415] pla_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[416] pla_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[417] pla_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[418] pla_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[419] pla_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[420] pla_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[421] sol_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[422] sol_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[423] sol_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[424] sol_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[425] sol_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[426] sol_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[427] sol_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[428] sol_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[429] sol_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[430] sol_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[431] sol_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[432] sol_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[433] sol_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[434] sol_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[435] sol_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[436] sol_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[437] sol_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[438] sol_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[439] sol_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[440] sol_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[441] sol_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[442] sol_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[443] sol_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[444] sol_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[445] sol_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[446] sol_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[447] sol_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[448] sol_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[449] sol_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[450] sol_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[451] sol_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[452] sol_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[453] sol_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[454] sol_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[455] sol_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[456] sol_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[457] sol_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[458] sol_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[459] sol_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[460] sol_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[461] sol_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[462] sol_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[463] mul_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[464] mul_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[465] mul_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[466] mul_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[467] mul_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[468] mul_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[469] mul_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[470] mul_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[471] mul_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[472] mul_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[473] mul_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[474] mul_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[475] mul_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[476] mul_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[477] mul_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[478] mul_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[479] mul_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[480] mul_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[481] mul_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[482] mul_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[483] mul_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[484] mul_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[485] mul_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[486] mul_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[487] mul_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[488] mul_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[489] mul_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[490] mul_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[491] mul_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[492] mul_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[493] mul_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[494] mul_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[495] mul_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[496] mul_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[497] mul_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[498] mul_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[499] mul_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[500] mul_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[501] mul_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[502] mul_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[503] mul_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[504] mul_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[505] gar_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[506] gar_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[507] gar_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[508] gar_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[509] gar_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[510] gar_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[511] gar_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[512] gar_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[513] gar_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[514] gar_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[515] gar_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[516] gar_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[517] gar_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[518] gar_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[519] gar_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[520] gar_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[521] gar_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[522] gar_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[523] gar_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[524] gar_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[525] gar_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[526] gar_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[527] gar_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[528] gar_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[529] gar_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[530] gar_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[531] gar_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[532] gar_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[533] gar_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[534] gar_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[535] gar_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[536] gar_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[537] gar_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[538] gar_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[539] gar_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[540] gar_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[541] gar_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[542] gar_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[543] gar_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[544] gar_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[545] gar_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[546] gar_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[547] lum_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[548] lum_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[549] lum_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[550] lum_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[551] lum_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[552] lum_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[553] lum_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[554] lum_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[555] lum_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[556] lum_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[557] lum_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[558] lum_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[559] lum_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[560] lum_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[561] lum_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[562] lum_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[563] lum_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[564] lum_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[565] lum_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[566] lum_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[567] lum_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[568] lum_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[569] lum_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[570] lum_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[571] lum_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[572] lum_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[573] lum_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[574] lum_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[575] lum_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[576] lum_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[577] lum_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[578] lum_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[579] lum_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[580] lum_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[581] lum_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[582] lum_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[583] lum_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[584] lum_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[585] lum_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[586] lum_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[587] lum_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[588] lum_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[589] gob_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[590] gob_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[591] gob_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[592] gob_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[593] gob_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[594] gob_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[595] gob_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[596] gob_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[597] gob_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[598] gob_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[599] gob_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[600] gob_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[601] gob_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[602] gob_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[603] gob_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[604] gob_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[605] gob_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[606] gob_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[607] gob_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[608] gob_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[609] gob_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[610] gob_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[611] gob_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[612] gob_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[613] gob_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[614] gob_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[615] gob_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[616] gob_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[617] gob_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[618] gob_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[619] gob_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[620] gob_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[621] gob_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[622] gob_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[623] gob_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[624] gob_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[625] gob_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[626] gob_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[627] gob_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[628] gob_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[629] gob_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[630] gob_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[631] sal_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[632] sal_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[633] sal_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[634] sal_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[635] sal_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[636] sal_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[637] sal_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[638] sal_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[639] sal_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[640] sal_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[641] sal_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[642] sal_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[643] sal_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[644] sal_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[645] sal_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[646] sal_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[647] sal_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[648] sal_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[649] sal_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[650] sal_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[651] sal_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[652] sal_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[653] sal_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[654] sal_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[655] sal_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[656] sal_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[657] sal_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[658] sal_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[659] sal_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[660] sal_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[661] sal_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[662] sal_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[663] sal_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[664] sal_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[665] sal_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[666] sal_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[667] sal_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[668] sal_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[669] sal_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[670] sal_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[671] sal_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[672] sal_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[673] trt_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[674] trt_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[675] trt_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[676] trt_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[677] trt_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[678] trt_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[679] trt_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[680] trt_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[681] trt_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[682] trt_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[683] trt_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[684] trt_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[685] trt_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[686] trt_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[687] trt_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[688] trt_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[689] trt_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[690] trt_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[691] trt_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[692] trt_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[693] trt_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[694] trt_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[695] trt_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[696] trt_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[697] trt_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[698] trt_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[699] trt_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[700] trt_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[701] trt_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[702] trt_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[703] trt_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[704] trt_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[705] trt_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[706] trt_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[707] trt_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[708] trt_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[709] trt_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[710] trt_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[711] trt_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[712] trt_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[713] trt_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[714] trt_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[715] eel_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[716] eel_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[717] eel_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[718] eel_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[719] eel_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[720] eel_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[721] eel_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[722] eel_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[723] eel_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[724] eel_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[725] eel_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[726] eel_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[727] eel_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[728] eel_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[729] eel_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[730] eel_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[731] eel_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[732] eel_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[733] eel_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[734] eel_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[735] eel_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[736] eel_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[737] eel_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[738] eel_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[739] eel_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[740] eel_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[741] eel_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[742] eel_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[743] eel_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[744] eel_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[745] eel_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[746] eel_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[747] eel_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[748] eel_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[749] eel_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[750] eel_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[751] eel_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[752] eel_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[753] eel_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[754] eel_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[755] eel_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[756] eel_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[757] per_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[758] per_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in otper habitats (with possible impacts to their fitness).

[759] per_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[760] per_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[761] per_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[762] per_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[763] per_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[764] per_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[765] per_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[766] per_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[767] per_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[768] per_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[769] per_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[770] per_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[771] per_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[772] per_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[773] per_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[774] per_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[775] per_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[776] per_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[777] per_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[778] per_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[779] per_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[780] per_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[781] per_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[782] per_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[783] per_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[784] per_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[785] per_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[786] per_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[787] per_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[788] per_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[789] per_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[790] per_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[791] per_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[792] per_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[793] per_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[794] per_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[795] per_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[796] per_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[797] per_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[798] per_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[799] ppe_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[800] ppe_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[801] ppe_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[802] ppe_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[803] ppe_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[804] ppe_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[805] ppe_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[806] ppe_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[807] ppe_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[808] ppe_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[809] ppe_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[810] ppe_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[811] ppe_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[812] ppe_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[813] ppe_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[814] ppe_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[815] ppe_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[816] ppe_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[817] ppe_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[818] ppe_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[819] ppe_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[820] ppe_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[821] ppe_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[822] ppe_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[823] ppe_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[824] ppe_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[825] ppe_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[826] ppe_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[827] ppe_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[828] ppe_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[829] ppe_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[830] ppe_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[831] ppe_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[832] ppe_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[833] ppe_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[834] ppe_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[835] ppe_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[836] ppe_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[837] ppe_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[838] ppe_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[839] ppe_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[840] ppe_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[841] pik_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[842] pik_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[843] pik_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[844] pik_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[845] pik_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[846] pik_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[847] pik_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[848] pik_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[849] pik_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[850] pik_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[851] pik_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[852] pik_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[853] pik_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[854] pik_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[855] pik_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[856] pik_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[857] pik_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[858] pik_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[859] pik_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[860] pik_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[861] pik_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[862] pik_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[863] pik_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[864] pik_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[865] pik_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[866] pik_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[867] pik_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[868] pik_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[869] pik_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[870] pik_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[871] pik_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[872] pik_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[873] pik_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[874] pik_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[875] pik_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[876] pik_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[877] pik_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[878] pik_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[879] pik_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[880] pik_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[881] pik_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[882] pik_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[883] eep_hab_low: Low

Population is a habitat generalist and utilizes very common abiotic habitats during the entire ontogeny. Occurrences of early life stages and adults have been documented in diverse habitats. The population inhabits a widespread and common habitat (e.g., vast stretches of sandy bottom, or pelagic waters over a large range).

[884] eep_hab_mod: Moderate

Population strongly prefers a particular habitat but no life stage relies on it. The population or one life stage prefers a particular habitat, but can survive in other habitats (with possible impacts to their fitness).

[885] eep_hab_high: High

Population is a specialist on an abundant habitat. The population or one life stage is a specialist that is restricted to a specific, but common habitat (e.g. sandy bottoms, freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. as nursery grounds or as spawning areas for adults (homing behavior)).

[886] eep_hab_vhigh: Very high

Population is a specialist on a restricted habitat. The population or one life stage is a specialist that is restricted to a specific and limited habitat (e.g. seagrass beds, gravel beds in freshwater streams). Consider the dependence on specific habitats during ontogeny (e.g. vegetated areas as nursery grounds or as spawning areas for adults (homing behavior)).

[887] eep_prey_low: Low

Population eats a large variety of prey (opportunistic feeder). Population is opportunistic feeder and can eat a variety of prey types depending on what is available (include detritivores, herbivores, and omnivores in this bin). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[888] eep_prey_mod: Moderate

Population eats a limited number of prey types (opportunistic feeder). Population is rather opportunistic and can feed on a wide variety of prey species, but is more restricted to a limited number of prey types (copepods, krill, forage fish, etc.). Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[889] eep_prey_high: High

Population is partial to a single prey type (prey specialist). Population is rather a prey specialist and diet is composed of one main prey type. The stock is able to switch to a different prey type if the preferred food is unavailable, but this may negatively impact fitness. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[890] eep_prey_vhigh: Very high

Population is a prey specialist. Population is a prey specialist, depends on one prey type and is unable to switch to alternatives if the preferred prey is unavailable. Please consider only juveniles and adults here, larvae are considered in bin "Early Life History Survival and Settlement Requirements".

[891] eep_mob_low: Low

Highly mobile and non-site dependent adults. Adults are highly mobile and non-site dependent. Adult fish has the capacity to move to new habitats in order to maintain preferred environmental conditions.

[892] eep_mob_mod: Moderate

Highly mobile and site dependent adults. Adults are mobile with site-dependency. Adult fish has the capacity to move from one site to another if necessary or have the potential to move to other habitats in order to maintain preferred environmental conditions.

[893] eep_mob_high: High

Site dependent with limited mobility. Adults are site-dependent and restricted in their movement by environmental or behavioral barriers (won't swim across open ocean). Adult fish has limited capacity to move (movements only within meter distance) to other habitats in order to maintain preferred environmental conditions.

[894] eep_els_low: Low

Highly dispersed eggs and larvae. Planktonic eggs and larvae are dispersed > 100 km from spawning location. Eggs/larvae show a high dispersal capacity with the ability to colonize potential new habitats, when conditions become unfavorable.

[895] eep_els_mod: Moderate

Moderately dispersed eggs and larvae. Planktonic eggs and larvae are dispersed 10-100 km from spawning locations. Eggs/larvae show a moderate dispersal capacity with a moderate ability to colonize potential new habitats, when conditions become unfavorable.

[896] eep_els_high: High

Low dispersal of eggs and larvae Planktonic eggs and larvae are typically found over the same location as parents. Eggs/larvae show a low dispersal capacity with a low ability to colonize potential new habitats, when conditions become unfavorable.

[897] eep_els_vhigh: Very high

No egg dispersal, benthic eggs/larvae Benthic eggs (attached to specific substrates) or little to no planktonic early life stages (e.g. benthic larvae) show no dispersal capacity and ability to colonize potential new habitats and are highly vulnerable to climate-induced environmental changes.

[898] eep_ssr_low: Low

Egg and larvae have minimal requirements. Population has general requirements for the egg and larval stage that are relatively resilient to environmental change. Eggs and larvae are not dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[899] eep_ssr_mod: Moderate

Egg and larvae have minimal requirements or requirements are unknown but recruitment is relatively stable. Population requirements for egg and larval stage are not well understood but recruitment is relatively constant, suggesting limited environmental influence. Eggs and larvae are (to a certain degree) dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[900] eep_ssr_high: High

Eggs and larvae have some specific requirements. Population requirements for the egg and larval stage are not well understood, but recruitment is highly variable and appears to have a strong dependence on environmental conditions. Eggs and larvae are dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[901] eep_ssr_vhigh: Very high

Eggs and larvae have multiple specific requirements. Population has specific known biological and physical requirements for egg and larval survival. Eggs and larvae are highly dependent on specific biological conditions (e.g. presence and high abundance of specific food items, specific habitats, such as seagrass beds/wetlands) or physical conditions (e.g. specific temperature requirements, transport pathways to reach nursery areas).

[902] eep_spw_low: Low

Consistent throughout the year without a defined "spawning season". Population that spawns continuously throughout the year without a defined “spawning season” is less likely to suffer spawning failure. Example: a stock that spawns daily or monthly.

[903] eep_spw_mod: Moderate

Several spawning events throughout the year (across more than one season). Population that spawns several times per year and spawns across more than one season has a moderate likelihood of spawning success to be impacted by climate change. Example: a population that spawns in both the spring and summer.

[904] eep_spw_high: High

One spawning event per year within a confined time frame (over a period of less than 3 months/one season (e.g. spring spawners). Population that spawn once a year (with spawning waves) and all spawning events in that year take place in one season have a higher likelihood of being affected by climate change. Example: the spawning season occurs once a year and lasts over a period of less than 3 months.

[905] eep_spw_vhigh: Very high

One spawning event per year over a brief period of time. Population that requires very specific environmental/social cues to initiate spawning and that only spawns once per year has the highest likelihood of being affected by climate change. Example: the spawning season occurs once a year over a brief period of time (days or weeks).

[906] eep_stt_low: Low

Wide temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have no impact on spawning phenology. Population occurs across a wide range of temperatures (between 5-25°C) and/or has high thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (high) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[907] eep_stt_mod: Moderate

Moderate temperature range throughout ontogeny and adapted to warmer water temperatures. Changes in temperature have moderate impact on spawning phenology. Population occurs across a moderate temperature range (5-20°C) and/or has moderate thermal optimum. Species is found in warmer waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (moderate) potential to adapt to phenology shifts (and related effects, such as match-mismatch of prey or habitat requirements).

[908] eep_stt_high: High

Somewhat limited temperature range throughout ontogeny and adapted to colder water temperatures. Changes in temperature have moderate/high impact on spawning phenology (due to moderate/low spawning temperature threshold). Population occurs across a limited temperature range (5-15°C) and/or has low thermal optimum. Species is found in colder waters (consider global distribution, depth distribution and upper thermal limits for life stages). Please also consider the (limited) potential to adapt to phenology shifts (consider related effects, such as match-mismatch of prey or habitat requirements).

[909] eep_stt_vhigh: Very high

Very limited temperature range throughout ontogeny and well adapted to colder water temperatures. Changes in temperature have high impact on spawning phenology (due to low temperature threshold for spawning). Population occurs across a narrow temperature range (5-10°C) and/or has very low thermal optimum. Species is found in colder waters (consider global distribution) and species/early life stages rely on cold water temperatures for successful reproduction (consider limited depth distribution and upper thermal limits for life stages).

[910] eep_sts_mod: Moderate

Mesohaline/life stages occurring in the Baltic Sea are mesohaline. Population is able to adapt over a certain range of brackish water (5-18, Fishbase.org) without consequences on reproduction or fitness.

[911] eep_sts_high: High

Limited salinity range/life stages occurring in the Baltic Sea show a limited salinity range. Population is able to tolerate a certain range of brackish water (5-18, Fishbase.org) with limitation on reproduction and/or fitness.

[912] eep_sts_vhigh: Very high

Stenohaline/critical life stages (if resident in Baltic Sea) are stenohaline. No/very little tolerance to changes in salinity throughout ontogeny, consider temporal stenohaline critical life stages if resident in the Baltic Sea.

[913] eep_sta_low: Low

Population either does not rely on pH sensitive taxa (for food), or is expected to show no effect/impact to ocean acidification. Population does not utilize sensitive taxa for food. Species are expected to show no effects/impact to OA, consider sensitive life stages, changes in behavior (disturbed olfaction, homing).

[914] eep_sta_mod: Moderate

Population is somewhat reliant on sensitive taxa and/or at certain life stages susceptible to pH decrease. The population utilizes sensitive taxa (for food), but can switch to non-sensitive taxa when necessary, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[915] eep_sta_high: High

Population is reliant on sensitive taxa and/or certain life stage is negatively affect by a decrease in pH. The population is dependent on sensitive taxa (for food) (i.e., cannot switch to a non-sensitive alternative) and/or development of early life stages/general behavior is negatively affected by a decrease in pH.

[916] eep_sta_vhigh: Very high

Population is highly sensitive to a decrease in pH. Critical life stages of the population are highly sensitive to a decrease in pH, also consider the impact on development of sensitive life stages, changes in behavior (disturbed olfaction, homing).

[917] eep_pgr_low: Low

Population growth rate is high, high productivity Maximum growth rate (rmax) > 0.50 von Bertalanffy K > 0.25 Age at maturity < 2 yrs Maximum age < 10 yrs Natural mortality (M) > 0.50 Measured maximum length/Infinity length < 20 cm

[918] eep_pgr_mod: Moderate

Population growth rate is moderate, moderate productivity Maximum growth rate (rmax) 0.16 -0.50 von Bertalanffy K 0.16 - 0.25 Age at maturity 2 - 3 yrs Maximum age 11 - 15 yrs Natural mortality (M) 0.31 - 0.50 Measured maximum length/Infinity length 20 - 50 cm

[919] eep_pgr_high: High

Population growth rate is low, low productivity, affected to any environmental changes Maximum growth rate (rmax) 0.05 -0.15 von Bertalanffy K 0.11 - 0.15 Age at maturity 4 - 5 yrs Maximum age 15 -25 yrs Natural mortality (M) 0.21 - 0.30 Measured maximum length/Infinity length 50 - 80 cm

[920] eep_pgr_vhigh: Very high

Population growth rate is very low, low productivity: highly affected to any environmental changes Maximum growth rate (rmax) < 0.05 von Bertalanffy K <= 0.10 Age at maturity > 5 yrs Maximum age > 25 yrs Natural mortality (M) < 0.2 Measured maximum length/Infinity length > 80 cm

[921] eep_ost_low: Low

Population is experiencing no known/limited stress (other than fishing pressure). Population is experiencing no or no more than one known stressor. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to important habitats for all life stages).

[922] eep_ost_mod: Moderate

Population is experiencing limited/moderate stress (other than fishing pressure). Population is experiencing no more than two known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[923] eep_ost_high: High

Population is experiencing moderate/high stress (other than fishing pressure). Population is experiencing no more than three known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

[924] eep_ost_vhigh: Very high

Population is experiencing high/very high stress (other than fishing pressure). Population is experiencing four or more known stressors. Additional stressors are e.g. sensitivity to low oxygen, predation pressure, cannibalism, pollutants and diseases, eutrophication and related cascade effects (habitat deterioration, loss of vegetation, changes in pH/alkalinity), anthropogenic-caused habitat modification (high sedimentation loads, building dams or blocking access to of important habitats for all life stages).

LEGEND

Legend and structure of information in this file

Name of section

Enabling condition for this section

Question title

Type of question, scope

Variable name

Answer options

SECTION 5: OTHER INCOME SOURCES

E s4_other_sources_which.Contains(98)

Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur?

I This refers to family relations

E s3_time_other > 0

V1 s4_rel_leaders_which.Contains(98)

M1 Can not be itself

V2 (s3_time_other_breeding_advice <= (50 - s3_time_art_insem_advice)) ||s3_time_other_breeding_advice == 0

M2 This person is not in the list

F optioncode != s5_ignored_option_code

MULTI-SELECT
SCOPE: PREFILLED

s4_rel_leaders_other

01 ☐ Community animal health workers

02 ☐ Private

03 ☐ Government

04 ☐ Livestock keepers association

05 ☐ NGO

And 5 other [13]

Additional information:

"I" — Question instruction

"E" — Enabling condition

"V1" — Validation condition №1

"M1" — Message for validation №1

"F" — Filter in Categorical questions

Link to full set in appendix

Breadcrumbs

Type or roster

Roster Title

CHAPTER 3 IDENTIFICATION /

Roster: LEADER RELATION DETAILS

generated by fixed list:

01 Ward Livestock Officer

02 Village Livestock Officer

99 Other (specify)

List items