12 Norway pout in North Sea, Skagerrak, and Kattegat

nop.27.3a4 – *Trisopterus esmarkii* in Subarea 4 and Division 3.a

12.1 General

The September 2024 assessment of Norway pout in the North Sea and Skagerrak is an update assessment based on the August 2016 ICES WKPOUT benchmark assessment (ICES WKPOUT, 2017) and a inter-benchmark assessment in July 2020 (Brooks and Nielsen, 2020). In the benchmark assessment in 2016, a new assessment model was introduced (Seasonal Stochastic Assessment Model SESAM instead of the Seasonal XSA, SXSA), the assessment year was changed (from the calendar year to 1 October to 1 October and accordingly also now including quarter 3 in the assessment year compared to quarter 2 in previous assessments), the overall assessment period was changed (cutting off the original first assessment year 1983), the plus-group in the assessment was changed (from 4+ to 3+), and the assessment tuning fleets have been changed (removing the quarter 1, 3, and 4 commercial tuning fleets and keeping the same survey fleets). The assessment biological parameter settings are the same according to the inter-benchmark assessment in spring 2012 (ICES IBPNorwayPout, 2012b) with respect to the population dynamic parameter settings for natural mortality, maturity-at-age and mean weight at age. The previous settings in the assessment were constant natural mortality by quarter and age fixed at 0.4, 10% maturity for the 1-group and 100 % mature for the 2+ group, and constant MWA assumed in stock. The new settings according to the inter-benchmark (from May 2012 onwards) include constant quarterly and yearly natural mortality, but with varying M by age, 20% maturity for the 1-group, and slightly changed levels of constant mean weight at ages in the stock which were calculated from long-term averages of mean weight at age in the catch. These parameters have impact on the predictions and estimates of the SSB because the stock consists of very few year classes. Due to the introduction of revised IBTS (International Bottom Trawl Survey) quarter 1 (Q1) and quarter 3 (Q3) indices for the full survey time-series for all age groups of Norway pout by ICES in 2020 (https://github.com/ices-tools-prod/DATRAS/tree/master/ALK_substitution), the sustainability of the MSY $B_{trigger} = B_{lim}$ and $F_{cap} = 0.7$ reference points were evaluated in the inter-benchmark in July 2020 in Brooks and Nielsen (2020). Despite only a slight change in B_{lim} of less than 10% from B_{lim} = 39 447 t (Benchmark ICES WKPOUT 2016 estimate) to B_{lim} = 42 573 t by running the benchmark assessment with the new IBTS indices (Brooks and Nielsen, 2020), the WGNSSK 2020 working group decided to switch to the new B_{lim} reference point, and on this basis to calculate a new B_{pa} reference point. The sustainability of the currently implemented $F_{cap} = 0.7$ was accordingly evaluated with this new B_{lim} reference point (Brooks and Nielsen, 2020). These inter-benchmark evaluations showed that the current F_{cap} was also sustainable with the slightly revised B_{lim} reference point (Brooks and Nielsen, 2020). See also Sections 12.1.4, 12.6 and 12.9 below. The assessment is a "real time" monitoring and management run up to 1 October 2024 and includes new information from the second half year 2023 and for the quarters 1, 2 and 3 in 2024. The assessment includes the new 3rd quarter 2024 survey information also covering the 0-group 2024-year-class information, which is used real time in the 3rd quarter. Consequently, the assessment does not backshift this survey information to the second quarter as done in the SXSA assessment run up to 1 July in the assessment year before the benchmark assessment in 2016.

Furthermore, a short-term prognosis (Forecast) up to 1 November 2024 and 1 November 2025 is given for the stock based on the assessment. The catch projection is based on a changed forecast year from 1 November to 31 October.

12.1.1 Ecosystem aspects

Norway pout is a short-lived species and most likely a one-time spawner. The population dynamics of Norway pout in the North Sea and Skagerrak are very dependent on changes caused by recruitment variation and variation in predation or other natural mortality, and less by the fishery (Nielsen *et al.*, 2012). Recruitment is highly variable and influences SSB and total-stock biomass (TSB) rapidly because of the short lifespan of the species (Nielsen *et al.*, 2012; Sparholt *et al.*, 2002a, 2002b; see review in Nielsen, 2017). Furthermore, 20% of age 1 is estimated mature and is included in the SSB (Lambert *et al.*, 2009). Therefore, the recruitment in the year after the assessment year influences the SSB in the following year. Also, Norway pout is to a limited extent exploited from age 0. Only limited knowledge is available on the influence of environmental factors, such as temperature, on the recruitment (Kempf *et al.*, 2009; see review in Nielsen, 2017, Section 7). On this basis, Norway pout should be managed as a short-lived species.

Stock definition: Norway pout is a small, short-lived gadoid species, which rarely gets older than 5 years (Nielsen *et al.*, 2012, Lambert *et al.*, 2009). It is distributed from the west of Ireland to Kattegat, at the Faroe Islands, and from the North Sea to the Barents Sea. The distribution for this stock is in the northern North Sea (>57°N) and in Skagerrak at depths between 50 and 300 m (Raitt 1968; Sparholt *et al.*, 2002b; see review in Nielsen, 2017, Sections 2 and 4). Spawning in the North Sea takes place mainly in the northern part in the area between Shetland and Norway (Lambert *et al.*, 2009; Nash *et al.*, 2012; Huse *et al.*, 2008; See review in Nielsen, 2017, Section 4).

Previously, it has been evaluated that around 10 % of the Norway pout reach maturity already at age 1, and that most individuals reach maturity-at-age 2. Results in Lambert *et al.* (2009) show that the maturity rate for the 1-group is close to 20% in average (varying between years and sex) with an increasing tendency over the last 20 years. Furthermore, the average maturity rate for 2- and 3-groups in 1st quarter of the year was observed to be around 90% and 95%, respectively, as compared to 100% used in the assessment. Preliminary results from an analysis of regionalized survey data on Norway pout maturity, presented in Larsen *et al.* (2001), gave no evidence of a stock separation in the whole northern area, and this conclusion is supported by the results in Lambert *et al.* (2009) and in Nash *et al.* (2012). (See also review in Nielsen, 2017, Section 3).

Ecological role: The population dynamics of Norway pout in the North Sea and Skagerrak are very dependent on changes caused by high recruitment variation and variation in predation mortality (or other natural mortality causes) due to the short lifespan of the species (Nielsen *et al.*, 2012; ICES WGSAM, 2011; ICES WGSAM, 2014; Sparholt *et al.*, 2002a, b; Lambert *et al.*, 2009). Norway pout natural mortality is likely influenced by spawning and maturity having implications for its age specific availability to predators in the ecosystem and the fishery (Nielsen *et al.*, 2012). With present fishing mortality levels in recent years the status of the stock is more determined by natural processes and less by the fishery, and in general the fishing mortality on 0-group Norway pout is low (Nielsen *et al.*, 2012; ICES WGNSSK Reports; see review in Nielsen, 2017, Section 5). There is a need to ensure that the stock remains high enough to provide food for a variety of predator species. This stock is among other an important food source for the species saithe, haddock, cod, whiting, and mackerel and predation mortality is significant (ICES-SGMSNS, 2006; ICES WGSAM, 2011; ICES WGSAM, 2014; Cormon *et al.*, 2016; see review in Nielsen, 2017, Section 6). Especially high abundance of saithe predators and high stock level of northern mackerel as likely predators on smaller Norway pout are likely to significantly affect the Norway pout population dynamics. Interspecific and intraspecific density patterns in Norway pout mortality and maturity have been documented (Nielsen *et al.*, 2012; Lambert *et al.*, 2009; Cormon *et al.*, 2016; see review in Nielsen, 2017). Natural mortality levels by age and season used in the stock assessment do include the predation mortality levels estimated for this stock (ICES WGSAM, 2011; ICES WGSAM, 2014), and in the 2012 inter-benchmark assessment revised values for natural mortality have been used based on the results from Nielsen *et al.* (2012).

Biological interactions with respect to intraspecific and interspecific relationships for Norway pout stock dynamics and important predator stock dynamics have been reviewed and further analysed in Nielsen (2017; Section 6) and there is referred to the general conclusions here.

Ecosystem impacts of fishery: In order to protect other species (cod, haddock, whiting, saithe and herring as well as mackerel, squids, flatfish, gurnards, *Nephrops*) there is a row of technical management measures in force for the small-meshed fishery in the North Sea such as the closed Norway pout box, bycatch regulations, gear selective devices, minimum mesh size, and minimum landing size. A review of regulations on the Norway pout stock and be found in Nielsen *et al.* (2017). Benthic impacts of the Norway pout fishery have also been evaluated in Bigné *et al.* (2019).

12.1.2 Fisheries

The fishery is nearly exclusively performed by Danish and Norwegian vessels using small mesh trawls in the northwestern North Sea, especially at the Fladen Ground and along the edge of the Norwegian Trench in the northeastern part of the North Sea. Main fishing seasons are the 3rd and 4th quarter of the year with also high catches in the 1st quarter of the year especially before 1999. Recent catches in 1st quarter are relatively low. Some catch also originates from Norwegian fishery in the second quarter. Danish catches are in most recent years highest in 4th quarter. The Norway pout fishery is a mixed commercial, small-meshed fishery directed towards Norway pout as one of the target species together with Blue Whiting in the Norwegian fishery. The international commercial Norway pout fishery has been reviewed in Nielsen *et al.* (2017) including a detailed analysis of the Danish commercial fishery, and a detailed description of the Norwegian fishery can be found in Johnsen *et al.* (2017). These papers include among other detailed analyses of quarterly and spatial distribution of the Norway pout fishery and catches, the bycatches and discard, the quota uptake, and the fishery regulations. Furthermore, the Stock Annex also includes the long-term trends in average exploitation pattern. Recently, the Danish large vessel pelagic fleet fishery has been analysed in Paoletti *et al*. (2021) which also provide yearly, seasonal, and geographical fishing patterns with respect to effort allocation, catches and value of landings for the part of the Norway pout fishery conducted by this fleet for the period 2015–2020. The relative part of the total Danish catch has been increasing for the Danish large vessel pelagic fleet in recent years compared to the Danish demersal otter board fleet.

Landings have been relatively low since 2001 except for 2010 and recently in 2019–2020, and the 2003–2004 landings were the lowest on record (Tables 12.2.1–3; Figure 12.3.5). The directed fishery for Norway pout was closed in 2005, in the first half of 2006, and in 2007 as well as in the first half of 2011 and 2012. In the periods of closures, bycatch quotas were set for Norway pout in the Norwegian mixed blue whiting fishery around 5 kt in some years, as well as in a small experimental fishery in 2007 (1 kt). In the open periods of 2008, 2009, and 2011 the fishing effort and catches have been low. Catches were above 100 kt in 2010 but have in the period 2012–2018 been well below 100 kt, while they increased again in 2019–2021 to be above 100 kt in 2020. The landings in 2021 were 72.0 kt and decreased again in 2022-2023 to around 30 kt. The quota has not been taken in those years. The fishery has in these periods mainly been based on the 2008, 2009, 2012, 2014, 2016, 2018-2020 and 2022-year classes being above the long-term average level. The TAC was not taken in 2008–2010 and 2012–2023, while the small TAC in 2011 was taken. The lack of full quota uptake is likely due to targeting of other industrial species like sprat for which fishing costs are lower, but also high fishing (fuel) costs compared to catch rates and also bycatch regulations (mainly in relation to herring and whiting bycatch) have an impact (see also details in Nielsen *et al.*, 2016 and Paoletti *et al.*, 2021). In recent years the bycatch quota regulation of max 20% herring catch on trip basis has been restrictive according to the fishing industry, but also the high fishing costs compared to densities and stock size. Late opening of the fishery at the end of quarter 3 in 2012, and individual quotas for the Danish fishery in general, as well as the recent implementation of a general herring bycatch quota in the North Sea, play a role in the uptake. Trends in yield are shown in Table 12.3.6 and Figure 12.3.5.

Bycatch of herring, saithe, cod, haddock, whiting, and monkfish at various levels in the small-meshed fishery in the North Sea and Skagerrak directed towards Norway pout has been documented (Bigné, Nielsen and Bastardie, 2019; Degel *et al*., 2006, ICES CM 2007/ACFM:35, (WD 22 and Section 16.5.2.2); see also review in Nielsen *et al.*, 2016). Bycatches of these species have been relatively low in the recent decade, and in general, the bycatch levels have decreased in the Norway pout fishery over the years. The declining tendency of bycatch of other species in the Norway pout fishery also appears from Table 12.2.1. However, here it can also be observed that the bycatches have increased slightly in 2019-2020, but declined again in 2021–2023. Trends in bycatch levels in the samples from monitoring of the Danish and Norwegian commercial Norway pout fishery should also be further analysed in future benchmark assessments as the revised monitoring and sampling systems of catches may give more precise bycatch estimates. Review of scientific documentation show that gear selective devices can be used in the Norway pout fishery, significantly reducing bycatches of juvenile gadoids, larger gadoids, and other non-target species as well as herring (Eigaard and Holst, 2004; Nielsen and Madsen, 2006, ICES CM 2007/ACFM:35, WD 23 and section 16.5.2.2; Eigaard and Nielsen, ICES CM2009/M:22; Eigaard, Hermann and Nielsen, 2012; see also review in Nielsen *et al*., 2016; Johnsen *et al*., 2017; Eigaard *et al*., 2021). Sorting grids are at present used in the Norwegian and Danish fishery (partly implemented as management measures for the larger vessels), but modification of the selective devices and their implementation in management is still ongoing. Existing technical measures such as the closed Norway pout box, minimum mesh size in the fishery, and bycatch regulations to protect other species have been maintained. Norwegian trawlers have not been allowed to fish Norway pout in the British zone (previous EU zone) in 2021-2024. From 2013 to 2020, between 23% and 50% of the annual Norwegian landings of Norway pout were caught within this British zone. The consequences of Brexit on Danish Norway pout fisheries in the British zone from 2025 onwards should also be investigated.

A detailed description of the regulations and their background can be found in Nielsen *et al.*, (2016) and in the Stock Annex.

The quality of the landings statistics in Norway and Denmark is described in the ICES WKPOUT (2017) and associated Annexes (Nielsen *et al.*, 2016; Johnsen *et al.*, 2017). The quality seems to be relatively constant during the last 20 years and of a higher quality than in the years before. From April 2020 onwards, the sampling intensity of the Danish Norway pout fishery has increased where every landing is now sampled, and the number of required samples increase with the landing weight from a minimum of 6 to a maximum of 24 per landing. This new sampling system may give more precise estimates of bycatches which should be evaluated in future benchmark assessments. The discard level of Norway pout in the North Sea fisheries is considered to be low (Nielsen *et al.*, 2016).

From 2020, the catch at age and the individual weight estimates of the Norwegian landings of Norway pout have used samples based on a probabilistic survey method for at sea sampling (Otterå *et al*., 2023).

12.1.3 ICES advice

In September 2023, the advice on North Sea Norway pout was updated. Based on the estimates of SSB in September 2023, ICES classified the stock to show full reproductive capacity with a SSB just above B_{pa}. Norway pout is a short-lived species. Recruitment is highly variable and strongly influences the spawning stock and total biomass. The default ICES approach to MSY-based management for short-lived species is an escapement strategy, i.e. to maintain SSB, with 95%

probability, above B_{lim} after the fishery has taken place. The forecast is stochastic and uncertainties in the assessment and forecast are directly considered to ensure the SSB stays above B_{lim} with 95% probability according to the ICES MSY and Precautionary Approach for short-lived species. For the implementation of the escapement strategy, which aims to maintain the SSB above B_{lim} after the fishery has taken place, SSB is calculated for quarter 4 as a proxy for SSB at spawning time (quarter 1). The B_{lim} value was adjusted in the benchmark assessment in 2016 and again in the inter-benchmark and MSE in 2020 due to changed IBTS indices (Brooks and Nielsen, 2020). The B_{lim} estimate in the 4th quarter is lower than the previous value of B_{lim} for the 1st quarter because the 0-group and many of the 1-group fish are not yet included in the estimate of SSB. The yearly catch forecast is for the period 1 October to 30 September. ICES considered that this forecast could be used directly for management purposes for the period 1 November to 31 October. In recent years, the escapement strategy has been practiced in reality in management.

The ICES advice in September 2023 was that with catches up to 20 583 t in the directed Norway pout fishery in the period 1 November 2023 to 31 October 2024 corresponding to a F around 0.12 taking into account a F_{cap} of 0.70 and that the 5th percentile of the spawning-stock biomass in the 4th quarter 2024 will remain above a reference level of B_{lim} (42 573 t). The SSB was expected to decline during 2023 and 2024 due to the below average 2021 and 2023 recruitment, the growth and 20% mature as 1-group, and still considering the high natural mortality as well as the short lifespan of the stock.

According to the escapement strategy, the fishery was closed 1 January 2012 because of the well below, nearly historical low, recruitment in 2010 and 2011. A small TAC of 6 kt was set for the second half year 2011 which was taken. Based on the high recruitment in 2012, the fishery was opened again for second half year 2012. Based on the above average recruitment in 2012, 2014, 2016, 2018, 2019, 2020 and 2022, as well as a just below average recruitment in 2015 and 2017, and the low recruitment in 2021 and 2023, the fishery has remained open for all of 2013–2023. The quota uptake has been low in recent years (Nielsen *et al*. 2016). The quota uptake in 2019 was below 75%, below 80% in 2020, below 35% in 2021-2022 and below 25% in 2023.

Fishing mortality has generally been lower than the natural mortality for this stock and has decreased in recent years below the long-term average F (0.30) as estimated from the assessment in September 2024.

There is biannual information available to perform real-time monitoring and management of the stock. This can be conducted both with fishery-independent and fishery-dependent information as well as a combination of those. Real time advice (forecast) and management options for 2024 (up to 31 October) was provided for the stock in autumn 2023 as well.

ICES advises that there is a need to ensure that the stock remains high enough to provide food for a variety of predator species. It is advised that bycatches of other species should also be considered in management of the fishery. Also, it is advised that existing measures to protect other species should be maintained.

12.1.4 Management up to 2022

There is no specific management objective set for this stock. With present fishing mortality levels, the status of the stock is more determined by natural processes and less by the fishery. The European Community has decided to apply the MSY approach for short lived species in taking measures to protect and conserve living aquatic resources, to provide for their sustainable exploitation and to minimize the impact of fishing on marine ecosystems.

ICES advised in 2005 real-time management of this stock. In previous years, the advice was produced in relation to a precautionary TAC, which was set to 198 000 t in the EC zone and 50 000 t in the Norwegian zone. On basis of the real-time management advice from ICES, EU and Norway agreed to close the directed Norway pout fishery in 2005, first part of 2006, all of 2007 and in first part of 2011 and 2012. In 2005 and 2007, the TAC was 0 in the EC zone and 5000 t in the Norwegian zone – the latter to allow for bycatches of Norway pout in the directed Norwegian blue whiting fishery. The final TAC set for 2008 was 115 kt (EU), 116 kt (EU) for 2009, 163 kt (EU) for 2010, 8 kt for 2011, 96 kt for 2012, 323 kt for 2013, 251 kt for 2014, 328 kt for 2015, 360 kt for 2016, 346 kt for 2017, 173 kt for 2018, 137 kt for 2019, 171 kt for 2020, 255 kt for 2021, 119 kt for 2022, and 117kt for 2023 however, the TACs were not taken during this period except for the small TAC in 2011. For 2023, the TAC includes a TAC of 11 kt for UK, and this has not been exploited. The TAC advice for 2024 up to now has been 20.6 kt. Fishery was closed in first half year 2011 and 2012. Bycatch regulations have sometimes been restrictive (e.g. in 2009 and 2010 mainly in relation to whiting bycatch).

In managing this fishery, bycatches of other species have been considered. Existing technical measures such as the closed Norway pout box, minimum mesh size in the fishery, selective sorting grids in the gears and bycatch regulations to protect other species have been maintained.

Long-term management strategies have been evaluated for this stock based on joint EU-Norway requests (see also Sections 12.20 and 12.23). ICES has evaluated and commented on three management strategies in 2007, although these have not been decided on. Long-term management strategies have been evaluated again in September 2012 and June 2013 based on new joint EU-Norway requests (ICES, 2012a) in spring 2012 and spring 2013 to be available for the September 2012 and September 2013 ICES advice, respectively. These MSEs have been presented in special ICES reports (Vinther and Nielsen, 2012; 2013). No long-term management strategies have been decided upon.

With the changes introduced by the August 2016 Norway pout benchmark assessment (ICES WKPOUT, 2016 and Annexes) involving change of assessment model, change of assessment year, change of assessment period, removal of the commercial fishery tuning fleet in the assessment, change of the plus-group in the assessment from 4+ to 3+ and change of the stock MSY reference level these previous MSEs could not be used anymore for long-term management plans of the stock (including the F_{cap} estimates made there).

Long-term management strategy evaluation according to the new assessment and the revised reference levels as established from the benchmark assessment in August 2016, have been requested in a joint EU-Norway request from November 2017. Based on this EU / Norway request ICES on 29 May 2018 released its advice evaluating long-term management strategies for Norway pout in area 4 and 3.a (ICES, 2018; ICES WKNPOUT, 2018) which is based on the work from the ICES WKNPOUT (2018) as presented to the ICES WGNSSK and approved by ICES ACOM in May 2018. This is summarized below.

ICES has evaluated sustainability of a range of harvest control rules (HCRs) within the escapement strategy currently used for Norway pout, with additional lower (TAC_{min}) and upper (TAC_{max}) bounds on TAC and optional use of upper fishing mortality values (F_{cap}) (ICES WKNPOUT, 2018). Several HCRs were identified that combined TAC_{min} in the range of 20 000–40 000 t and TAC_{max} less than or equal to 200 000 t (150 000 t or 200 000 t) and F_{cap} values of 0.3 and 0.4, resulting in no more than a 5% probability of the spawning-stock biomass falling below B_{lim}.

ICES has evaluated harvest control rules (HCRs) within the escapement strategy currently practiced (aimed at retaining a minimum stock size in the sea every year after fishing) that are furthermore simulated to be restricted by a combination of TAC lower bounds (TAC_{min}) and upper bounds (TAC_{max}). For some HCRs, an upper limit on F (F_{cap}) is also used for setting the TAC.

Because of uncertainties in the estimate of the incoming year class, escapement strategies for short-lived species, where catch opportunities are very dependent on the strength of the incoming year class, may lead to a TAC where a too high portion of the stock is caught. ICES evaluations were conditioned by a maximum realized level of fishing mortality the fishery can exert (assumed at 0.89; $F_{historical}$), which means that the full TAC will not be taken if the required F to catch the TAC exceeds this value.

The identified combinations of lower TAC_{min} bound, upper TAC_{max} bound, and F_{cap} give a less variable TAC and F from one year to the next, but also a lower long-term yield than the default escapement strategy. ICES is not in position to advice on this trade-off between higher yield and stability.

The results are sensitive to the assumption that the fishery stops catching Norway pout when F exceeds $F_{historical}$. Therefore, the HCR should be re-evaluated if future F exceeds $F_{historical}$ (0.89).

The evaluation showed that the current procedure for providing TAC advice for Norway pout, based on an escapement strategy is only precautionary with the addition of an F_{cap} at 0.7.

In consultations between EU and Norway held 5–6 September 2018, the advice was presented by ICES and in the following discussions, certain limited additional elements, to be reviewed by ICES, came up. This resulted in an additional EU / Norway request from September 2018 on evaluation of additional elements concerning the ICES advice evaluating long-term management strategies for Norway pout in area 4 and 3.a. Here ICES was requested to assess, following MSY $B_{escapement}$:

- which scenarios of TAC_{min} and TAC_{max} would be precautionary, if the F_{cap} is set at 0.7 (building on request part 2 and 3, pages 3 and 4 of the advice).
- which scenarios of TAC_{min} and TAC_{max} would be precautionary, if an interannual flexibility of +/-10% (both banking and borrowing) was introduced for Norway pout (building on request part 2 and 3, pages 3 and 4 of the advice, plus including precautionary scenarios with an F_{cap} of 0.7 – following from paragraph 1 of this request).

On this basis, ICES has evaluated additional harvest control rules (HCRs) within the escapement strategy currently used for Norway pout, with additional lower (TAC_{min}) and upper (TAC_{max}) bounds on TAC and use of an upper fishing mortality (F_{cap}) at 0.7. As for the scenario made for ICES May 2018 advice (ICES WKNPOUT, 2018), ICES evaluations were conditioned by a maximum realized level of fishing mortality the fishery can exert (assumed at 0.89; $F_{historical}$), which means that the full TAC will not be taken if the required F to catch the TAC exceeds this value.

This is presented in the ICES advice in ICES WKNPOUT (2018).

Several HCRs were identified that combined TAC_{min} in the range of 20 000–40 000 t and TAC_{max} less than or equal to 200 000 t, resulting in no more than a 5% probability of the spawning-stock biomass falling below B_{lim}. Increasing the F_{cap} from 0.4 (which was previously evaluated) to 0.7 results in a higher median and mean TAC, but also in a higher long-term probability of SSB falling below B_{lim}. It also results in a higher probability of being constrained by the TAC_{max}.

The evaluations and ACOM approval of this led to identification of an expanded set of sustainable scenarios with a F_{cap} of 0.7. Tables 1 and 2 in ICES WKNPOUT (2018) summarize the long-term (2023–2037) performance metrics for the (precautionary) combinations that result in no more than 5% probability of SSB falling below B_{lim} in the period 2023–2037. More detailed statistics for both precautionary and non-precautionary HCRs are shown in the Table 3 of this advice.

Given that Norway pout is short-lived and that the HCR scenarios are based on the escapement strategy, the application of an additional interannual quota flexibility of ±10% is not considered precautionary.

ICES has changed the historical IBTS Q1 and IBTS Q3 DATRAS indices for demersal species in the North Sea including the Norway pout indices based on introduction of a new calculation method for the indices. Brooks and Nielsen (2020) evaluated potential change in the MSY and PA sustainability reference points of using the revised IBTS survey indices in DATRAS compared to the previously used indices and presents output from exploratory Management Strategy Evaluation (MSE) with consequences for the precautionary F_{cap} of changed biomass reference points. That is, whether the F_{cap} of 0.7 is still sustainable with the changed biomass reference points for the stock resulting from this revision of survey data. The conclusion in Brooks and Nielsen (2020) is that with no limits on TAC, then the assumption of a maximum implementable F has a stronger effect on the simulated stock dynamics. When the maximum implementable F is near F_{cap}, then F_{cap} has very little effect on the stock dynamics. If we assume that the maximum implementable F is extremely large (2.0 which is more than double the maximum estimated value), then the effect of F_{cap} can be seen again. With maximum implementable F at either its maximum historical estimate or at 1.0, then all risk statistics still show $F_{cap} = 0.7$ to be precautionary. Furthermore, even with the unrealistically high maximum implementable F, then the only risk that goes above 0.05 (when rounded to the nearest 0.01 units) is risk3.long.Q4 for a $F_{cap} = 0.7$. The type 3 risk statistics may require more replicates to converge to the true value expected from infinite replicates; if needed, this could be investigated in a benchmark. However, the overall result is that risk 1 statistics all indicate precautionarity even under extreme assumptions for high fishing effort.

No decision on long-term management plans is currently available for the Norway pout in area 4 and 3.a based on the identified sustainable scenarios. The stock is still managed according to the escapement strategy with a F_{cap} of 0.7 and with no lower TAC_{min} bound or upper TAC_{max} bound set. See also Sections 12.6 and 12.9 below.

An overview of recent relevant management measures and regulations for the Norway pout fishery and the stock can be found in Nielsen *et al.* (2017) and in the Stock Annex.

12.2 Data

12.2.1 Landings/catches

Data for annual nominal landings of Norway pout as officially reported to ICES are shown in Table 12.2.1. The landings equal the catches of Norway pout as discards in this small-meshed fishery is negligible (see also Nielsen *et al.*, 2016). Historical data for annual landings (catches) as provided by ICES (Working Group) are presented in Table 12.2.2, and data for national landings (catches) by quarter, year and by geographical area are given in Table 12.2.3. Total observed and predicted (by the SESAM stochastic assessment model) catches by quarter is given in Table 12.2.3a. Both the Danish and Norwegian landings (catches) of Norway pout were low in 2007 and 2011. The landings were moderate in 2008–2009, 2012, 2014 and 2017–2018, higher in 2013 and 2015–2016, and high in 2010 (126 kt), 2019 (98 kt) and 2020 (129 kt). The landings in 2021 were moderate on 72 kt and low in 2022-2023 on respectively 36 and 27 kt. The TAC was not fully fished in any of those recent years. The most recent catches have been included in the assessment for the 1st to 3rd quarter 2024, which were also very low (2 kt). Catches for the 3rd quarter 2024 include Danish and Norwegian catches up to 15th September 2024. Catches in the last 15 days of 3rd quarter 2024 are assumed to be relatively low and no estimates on that have been included in the assessment.

12.2.2 Age compositions in landings

Age compositions were available from Norway and Denmark (except for Norway in 2007 and 2008). Catch in numbers-at-age by quarter of year is shown in Table 12.2.4. Only very few biological samples were taken from the low Norway pout catches in 2005 and 2011, as well as in first half year 2006, 2007, and 2012, and also from the very low Danish catches in the three first quarters of 2023 and 2024. The data are in the InterCatch database.

As no age composition data for Norwegian landings have been provided for 2007 and 2008 because of small catches, the catch-at-age numbers from Norwegian fishery are calculated from Norwegian total catch weight divided by mean weight at age from the Danish fishery for those years. As no age composition data for the Danish landings in first half year 2010 have been sampled because of very small catches the catch-at-age numbers from Danish fishery is calculated from Danish total catch weight divided by mean weight at age from the Norwegian fishery in 2010. There were very little samples providing information on age composition from the very low Danish catches in quarter 1-3 of 2023 (ICES SA 4) and quarter 1-3 of 2024 (ICES SA4, ICES Div. IIIa), and it has been necessary to supplement them with biological information from Danish catches in the same quarters and areas in the previous year and adjacent areas of the same year. Only fishery targeting Norway pout where more than 70% of the catch is Norway pout is sampled from Danish catches, and the main catches in this period have been by-catch of Norway pout mainly in the herring small meshed fisheries. As the catch is very low in those quarters the impact of this on the output of the assessment is insignificant. Samples and biological information from the Danish fishery is available for 4th quarter 2023.

A full-scale Norway pout age reading check and otolith exchange program was made in 2018 with participation of 14 readers from seven countries (Denmark, Norway, Scotland, UK, France, Netherlands, and Germany; ICES WGBIOP, 2018). Different methods were applied for age determination of this species; whole, broken, and sectioned otoliths and images were provided of samples prepared using each method. Samples were collected during the 2016 Q3 IBTS and 2014 Q4 commercial fishing trips from ICES area 27.4.a covering the length range of the fish and considered adequately representative of the stock. Results based on sectioned otoliths were exceptional with an overall percentage agreement based on modal age of 99% and an average CV of 3% (ICES WGBIOP, 2018). For the whole and broken otoliths, the average percentage agreement based on modal age is 82%, with an average CV of 20%. There is a slight tendency for some readers to overestimate the age at modal age 0 and 1 and underestimate compared with modal age 2. The bias that existed between the primary readers from Norway and Denmark in 2016 is still apparent. These results are based only on those readers who provide age data for assessment purposes. In conclusion, there is an overall high level of agreement between readers of the Norway pout - nop.27.3a4 stock. The agreement is higher between the countries who read sectioned otoliths (Germany and UK-England) compared to those who read whole (Denmark) and broken otoliths (Denmark, Norway, and UK-Scotland; ICES WGBIOP, 2018). Further details on the age reading checks and analyses can be found in Section 12.10 below.

12.2.3 Weight-at-age

Mean weight-at-age in the catch is estimated as a weighted average of Danish and Norwegian data. Mean weight-at-age in the catch is shown in Table 12.2.5 and the historical levels, trends, and seasonal variation in this is shown in Figure 12.2.1. Mean landings weight-at-age from Danish and Norwegian fishery from 2005–2008, as well as for 2011, and from the Danish fishery in the three first quartes of 2023-2024, are uncertain because of the few observations and very low catches here. Missing values have been filled in using a combination of sources, covering values from the same quarters in previous year, as well as from adjacent quarters and areas and from other countries within the same year, for the period 2005–2008, 2011, and in first half year 2010, as well as supplemented the Danish samples for the first three quarters of 2023-2024. Finally, mean weight-at-age information from Norway has in 2011 involved survey estimates. The assumptions of no changes in weight-at-age in catch in these years and quarters do not affect assessment output significantly because the catches in the same period were very low. Mean weight-at-age data are available from both Danish and Norwegian fishery in 2009, second half 2010, second half 2011, second half 2012, and all of 2013–2023 as well as for quarter 1 to quarter 3 2024, but only very few samples available from the Danish fishery in the 3 first quarters of 2023-2024. Relative low mean weights-at-age have been observed for age groups 1–2 in quarter 1 in 2019–2020. Danish data and age readings have been checked according to this. Very small fish were observed in this period in the Danish catches, so this is not an artefact.

Mean weight-at-age in the stock is given in Table 12.2.6. The inter-benchmark assessment in spring 2012 (ICES IBPNorwayPout, 2012b) introduced revised estimates of mean weight-at-age in the stock used in the Norway pout assessment. The background and rationale behind the revision of mean weight-at-age in the stock is described in the IBPNorwayPout report (ICES, 2012b) and primary literature (e.g. Lambert *et al.*, 2009). On this basis, the same mean weight-at-age by quarter in the stock is used for all years, and mean weight-at-age in the catch is partly used as estimator of weight in the stock. Based on the 2016 benchmark assessment (ICES WKPOUT 2017), slightly revised constant mean weight-at-age estimates in the stock were used both in the benchmark assessment and in the following update assessments for the 1-, 2- and 3-groups by quarter taken as the long-term averages from the commercial mean weight-at-age data. Data for mean weight-at-age by quarter for age 0 were kept constant as estimated in the 2012 inter-benchmark. The revised mean weight at age in the stock was applied in the assessment runs as obtained from long-term averages measured from the commercial fishery catch. This has resulted in slightly changed levels of constant mean weight-at-ages in the stock compared to the 2012 inter-Benchmark which have been calculated partly from long-term averages of mean weight-at-age in the catch. In the Stock Annex and in Nielsen (2017), a summary is given of the inter-benchmark revisions in 2012 of the population dynamic parameters in the assessment. No major revision of mean weight-at-age in the stock has been performed in 2016 (ICES WKPOUT 2017) compared to the values used in previous assessments. The estimation of mean weights-at-age in the catches and the used mean weights in the stock in the assessment is described in Nielsen (2017) and in the Stock Annex. The data are in the InterCatch database.

12.2.4 Maturity and natural mortality

The inter-benchmark assessment in spring 2012 (ICES IBPNorwayPout, 2012b) introduced revised estimates of maturity and natural mortality-at-age used in the Norway pout stock assessment. The background and rationale behind the revision of the natural mortality and maturity parameters is described in the IBPNorwayPout report (ICES, 2012b) and primary literature (e.g. Nielsen *et al.*, 2012; Lambert *et al.*, 2009; ICES WGSAM, 2011; ICES WGSAM, 2014). In Nielsen (2017) and in the Stock Annex a summary is given of the inter-benchmark revisions of the population dynamic parameters used in the assessment where maturity and natural mortality used in the assessment is described. Proportion mature and natural mortality by age and quarter used in the assessment is given in Table 12.2.6.

The same proportion mature, and natural mortality are used for all years in the assessment. The proportion mature used is 0% for the 0-group, 20% of the 1-group and 100% of the 2+-group independent of sex. The revisions of the maturity ogive which have been implemented in the 2012 inter-benchmark assessment as well as in the present assessment is based on results from a paper by Lambert *et al.* (2009) indicating that the maturity rate for the 1-group is close to 20% in average (varying between years and sex) with an increasing tendency over the last 20 years. Furthermore, the average maturity rate for 2- and 3-groups in 1st quarter of the year was observed to be only around 95% as compared to 100% used in the assessment.

Instead of using a constant natural mortality set to 0.4 for all age groups in all seasons as used in the previous assessments, then variable natural mortality between ages have been introduced in the 2012 ICES IBPNorwayPout inter-benchmark assessment (ICES, 2012b) and the present assessment. The revision of the natural mortality parameters is based on results in Nielsen *et al*. (2012) and the ICES WGSAM (2011) and ICES WGSAM (2014) multispecies assessment reports. The revised values are shown in Table 12.2.6.

12.2.5 Summary of inter-benchmark assessment on population dynamic parameters

A summary of the ICES Spring 2012 inter-benchmark assessment with revised weight, maturity and natural mortality parameters at age included in the assessment is given in Nielsen (2017) and in the Stock Annex as well as in the ICES IBPNorwayPout inter-benchmark assessment report (ICES, 2012b).

12.2.6 Catch, effort and research vessel data

Description of catch, effort and research vessel data used in the assessment is given in the ICES WKPOUT 2016 Benchmark Report (ICES, 2017) and its Annexes, in Section 12.2.6 below, as well as in the Stock Annex (see also Table 12.3.1).

12.2.6.1 Commercial fishery data

Catch information for 1984–2024 is included in this assessment as presented in tables 12.2.1–12.2.5 and Figure 12.2.1. Catches in all of 2005, 1st quarter 2009, first half year 2011 and 2012, and first quarter 2013 were nearly 0 and only very limited information exists about this catch. Consequently, there has been assumed and used low catches of 0.1 million individuals per age (for age groups 1–3) per quarter in the assessment for 2005 and 2011. The fishing effort and catch efficiency (catch per unit effort) and of the Danish and Norwegian commercial fishery according to year and quarter of year are shown in tables 12.2.7 and 12.2.8, respectively, and according to year and fishing vessel engine horsepower category in Tables 12.2.9 and 12.2.10, respectively. Furthermore, trends herein are shown in Nielsen *et al.* (2017), in Johnsen *et al.* (2017) and in Paoletti *et al*. (2021).

No commercial fishery tuning fleet is included in the assessment from 2006 onwards based on the decisions made in the Norway pout benchmark assessment in September 2016 (ICES WKPOUT, 2017).

12.2.6.2 Research vessel data

Fishery-independent survey data used as tuning fleets in the present assessment is given in Table 12.2.11 and Figure 12.2.2 (see also Table 12.3.1).

Survey indices series of abundance of Norway pout by age and quarter are for the assessment period available from the IBTS (International Bottom Trawl Survey 1st and 3rd quarter) and the EGFS (English Ground Fish Survey, 3rd quarter) and SGFS (Scottish Ground Fish Survey, 3rd quarter), Table 12.2.11. The new survey data from the 1st quarter 2024 IBTS and the 3rd quarter 2023 IBTS research surveys have been included in this September 2024 assessment as well as the 3rd quarter 2024 EGFS and SGFS research survey information. The survey data time-series including the new information is presented in Table 12.2.11, as well as trends in survey indices in Figure 12.2.2. Surveys covering the Norway pout stock are described in detail in ICES WKPOUT (2016), Nielsen (2017) and in Johnsen and Søvik (2017) as well as in the Stock Annex. Survey data time-series used in tuning of the Norway pout stock assessment are described below.

From 2009 and onwards, the SGFS changed its survey area slightly with a few more hauls in the northern North Sea and a few less hauls in the German Bight. This is not evaluated to influence the indices significantly as the indices are based on weighted subarea averages.

In 3rd quarter 2015–2016 test trials were conducted in the international third quarter IBTS with 15 min duration hauls compared to 30 min duration hauls. The new 15 min test hauls have been included in the index calculation for 3rd quarter 2015–2016, and will potentially affect the Norway pout indices for the SGFS and the combined IBTS Q3 index. It has been necessary to include the 15 min hauls in the SGFS 2015–2016 data as extensive areas (of the total SGFS survey area) are only covered with this type of hauls. Only one 15 min test haul was included in the EGFS 2015 and none in 2016. There has been no continuation of the tow duration experiment in the Q3 surveys in 2017–2024 and, accordingly, no new 15 min hauls have been conducted and included in the Q3 2017–2024 SGFS and EGFS survey indices (and consequently in the combined Q3 IBTS survey index). Analyses of this are still ongoing and nothing conclusive is available at present concerning potential significant impacts of this on the indices. Preliminary analyses indicate no significant differences in catch rates of Norway pout between the 15 min hauls and the 30 min hauls in the SGFS, however, the variability is very high and there are only very few observations available. Long time-series and many observations are necessary to make statistically robust evaluations of and conclusions on potential differences.

In September 2015, the EGFS survey indices were revised as to incorporate the relevant primes within the Norway pout area following the IBTS Manual (2015), i.e. in the selection of the prime stations to be included in the Norway pout index calculation. The revision is described in detail in an ICES working document to ICES WGNSSK 2015 (Silva, 2015). This has changed the EGFS indices for Norway pout for all years and ages since 1992. Especially, the indices for the 0-group have changed significantly without any obvious trends over time. However, the perception of the dynamics in the stocks (e.g. strong year classes as 0-group and also as older ages in the cohorts) seems not to have changed in relative terms for this survey. Consequently, there is consistency in this to the previous EGFS indices and in relation to the other survey indices also for Norway pout. In the EGFS Q3 2017–2024, an additional haul has been taken (prime 77 – DATRAS haul number 147) fished on behalf of the Scottish (SGFS) that falls inside ICES rectangle 40E8 and, therefore, inside the Norway pout index area according to the IBTS manual. This prime is expected to be fished from now on by the English (EGFS) so it will fall inside the English survey index instead of the Scottish survey index. In order to make the EGFS time-series consistent over time it has been decided to exclude the Prime 77 haul in the 2017–2024 indices used in the assessment. By comparison, it appears that the survey trends seem similar without prime 77 in the EGFS for 2017–2024. In the 2020, 2021 and 2023, EGFS survey, all 77 prime stations were successfully fished aimed at 30 minutes tows, though with some reduced to at least 20 minute tows for operational reasons. Due to technical issues with the research vessel in the 2022 EGFS survey, not all the tows were completed as intended, completing 66 or the 77 planned tows with an additional 5 tows completed on behalf of our Scottish colleagues (SGFS survey). Of the 45 planned tows that contribute to the Norway Pout indices, 5 rectangles were missed (44F4, 45F3, 51F0, 51F1 and 51F2) without significant geographical trends. However, these tows may have been fished by other nations on the EGFS behalf, with 51F0-51F2 likely to have been picked up by UK(Scotland). The five tows completed on behalf of UK(Scotland) were fished in 40E8, 43F4, 46E9, 46E8 and 46E7. None of these have been included in the EGFS Norway pout indices calculation in order to be consistent. Additionally, of note, the station in 45E8 was shot in the incorrect rectangle (44E8) but was hauled in the correct rectangle. This too has been set as 45E8 in the data so is correctly accounted for within these indices. All 66 Prime stations and the additional 5 fished for Scotland were successfully fished, were aimed at being 30 minutes tows, though some were reduced to be either 15 or 20 minutes tows for operational reasons. In 2024, 76 of the planned tows in the EGFS were completed as intended with one station missed being an agreed "swap" between the English and Norwegian IBTS Q3 survey. The above modifications in the EGFS are not expected to change the perception of the trends in this survey index and not expected to have significant effect on the assessment results.

With respect to the SGFS 2017 Q3 index, around 5 survey days was lost in 2017 due to vessel issues. Hence, there were only 76 hauls in 2017 compared to 99 hauls in 2016. In 2016, there was almost a 50/50 split by ICES Subarea with 50 hauls undertaken in 4A and 49 in 4B in the SGFS. In 2017, this was slightly more unbalanced with 43 hauls taking place in 4A and 33 in 4B. In 2019, there has been a slight revision of the SGFS indices from 2013–2018 because of additional data check and removal of invalid hauls. This have resulted in very slight changes. As expected, the divergence was very small and typically around 1–3% increase and obviously were dependent on how many invalid hauls were recorded during each survey year. This does not at all change the perception of the trends in this survey index and does not have significant effect on the assessment results. Also, a few invalid hauls during the 2019 survey were encountered with the result that in order to ensure that there would be no loss to the overall survey Norway covered 6 of the stations normally completed by Scotland within the most North-Easterly 2 legs of the SGFS survey. These were stations 50F0, 50F1, 50F2, 48F1, 48F2 and 48F3. In 2018, these stations accounted for around 2% of the overall Norway Pout abundance for the survey so it is expected that although not an ideal situation from the perspective of providing consistent coverage the impact of this change will be minimal. In the SGFS 2020 survey, there was only one invalid haul, and the SGFS 2021 and 2023 surveys were conducted as planned. For the 2022 SGFS survey there was a delay in MS Scotia commencing this survey (2 weeks late). Accordingly, the area covered by Scotland was not quite as originally intended with some stations being covered by other nations whereas MS Scotia was out of action. In addition, MS Scotia was not able to secure access to Norwegian or Danish waters thereby restricting the eastern extent of the survey. Despite this, the SGFS survey coverage overall in 2022 was broadly in line with previous years with regard to effort with the number of stations completed within each of the old SGFS demersal areas being broadly in line (as a proportion of total) with 2021 aside from the numbers of stations completed around the Shetland area where there was an increase in effort largely due to other nations prioritizing other stations to complete at the point when the SGFS survey was under threat of cancellation due to vessel breakdown. However, based on the SGFS survey specialists have made comparative plots of the two SGFS survey years 2021 and 2022 with respect to geographical coverage, catch rates and abundance indices and compared the two plots for both years, they conclude that the index provided in 2022 is robust despite the necessary changes effected during 2022 quarter 3 SGFS survey programme. All hauls were completed as planned in the SGFS 2023 survey, but for the SGFS 2024 survey the spatial coverage has been impacted by the fact that the German IBTS survey was cancelled at the last minute so all the remaining survey participants had to try and move things around a little in order to minimise the impact felt by the loss of one of the surveys. For Scotland this meant that they ended up completing a second repeat station on their Southern boundary at 37F0, 37F1 and 37F2 and similarly they also had an additional repeat station completed at 51E8 right on their Northern boundary. Consequently, they did not complete their 5 stations on the transect 48E9 – 48F3 as that was covered for Scotland by Norway which allowed the SGFS the time to provide much needed survey cover further South. The above modifications are not expected to change the perception of the trends in this survey index and accordingly not to have significant effect on the assessment results.

Additionally, it should be noted that in the 2014 IBTS Q1 survey, less hauls were conducted in the northern part of the North Sea than usual. This did not result in change in the perception of the stock dynamics.

From 3rd quarter 2018, the depth range of the IBTS survey has been extended to 250 m (previously 200 m). The tows deeper than 200 m are extra stations. These stations have not been included in the NP survey indices. Obviously, those additional hauls cannot be included into the standard indices before the effects are statistically robustly evaluated and before reasonable time-series and adequate number of observations are available to analyse the potential effects of inclusion of the deeper tows in the indices.

In 2020, the IBTS quarter 1 (Q1) and quarter 3 (Q3) indices have been substantially revised (https://github.com/ices-tools-prod/DATRAS/tree/master/ALK_substitution) also covering the full Norway pout index time-series for all age groups. The changes in the survey indices and their influence on assessment results as well as sustainability reference points are shown, described, and evaluated in Brooks and Nielsen (2020). See also further details in Section 12.1.4 above and Sections 12.6 and 12.9 below. Again in 2023–2024, there seem to have been extensive updates of the IBTS Q1 and Q3 survey indices for Norway pout on DATRAS, and a few have changed substantially. However, for the most recent years this is not extensive. For the above reasons, it was in the in 2020 inter-benchmark assessment decided to keep the survey indices calculated with the new method constant in the period 1984–2019 as estimated in 2020 for future assessments, and only update the indices from 2020 onwards from the DATRAS IBTS Q1 and IBTS Q3 data and indices.

The survey data time-series including the new information are presented in Table 12.2.11.

12.2.6.3 Revision of assessment tuning fleets

The revision of the tuning fleets used in the benchmark 2004 assessment - as used in the 2005–2006 and 2007–2015 assessments – and the additional revisions of the tuning fleets in the benchmark 2016 assessment – as used in the September 2016 and future assessments - is summarized in Table 12.3.1. Details of the revision are described in the Stock Annex and in the ICES WKPOUT 2016 Report (ICES, 2016) and its Annexes.

The overall assessment period has been changed by cutting off the first assessment year (1983), so the assessment period is from 1984–2024, and the assessment tuning fleets have been changed by removing the quarter 1, 3, and 4 commercial tuning fleets and keeping the same survey fleets. The assessment biological parameter settings are the same according to the inter-benchmark assessment in spring 2012 (ICES IBPNorwayPout, 2012b) with respect to the population dynamic parameter settings in the assessment for natural mortality, maturity-at-age, and mean weight at age in the stock (see also Table 12.3.1).

12.3 Assessment: Catch-at-age data analyses

12.3.1 Review of assessment

The September 2023 assessment was accepted, and no major recommendations for changes and comments were given here. The minutes from the ADGPOUT2022 pointed out that the residuals of catches are lager than residuals from surveys. Also, the ADG commented in September 2022 on discrepancies between observed and model predicted catches in 2017 and 2019. This was responded to by the assessor in the draft advice in 2023: "The catch residuals are higher than the survey residuals in the assessment, but show no trends in the recent period from 2000 onwards. The observed and assessment model predicted catches and their seasonal patterns are also in good agreement in the same period, and the assessment model capture the seasonal fishing patterns well. The assessment is sensitive to the abrupt changes in the seasonal fishing patterns." There is also good agreement in the most recent years despite the tendency for 4th quarter catches to be more dominating relative to 3rd quarter catches for the most recent years. The ADGPOUT 2023 decided to remove this from the final advice as they concluded that "it is really not a problem with the assessment." Potential retrospective patterns in SSB and R were discussed at the ICES WGNSSK meeting in May 2018 as well in the following meetings, but no major issues and problems were pointed at, and it was concluded that the assessment has been performed correctly and performs relatively well. It should be noted that the retrospective patterns are within the uncertainty bounds of the assessment estimates for spawning-stock biomass, fishing mortality and recruitment. In the 2014 assessment review, it was only noted that potential area specific assessment should be considered in relation to a benchmark assessment.

12.3.2 Final assessment

A seasonal extension to the State-space Assessment Model (SAM) was used during this September 2024 assessment (SESAM), and in the benchmark 2016 Norway pout assessments reported in ICES WKPOUT (2017). In the latter, the SESAM assessment model was evaluated and compared with the assessment model previously used (Seasonal extended survivors analysis SXSA). It was found that this new model (SESAM) estimates very similar trends in SSB and fishing mortality compared to SXSA. The SESAM model was preferred by the ICES WKPOUT (2017) benchmark assessment group due to its ability to incorporate process and observation error and estimate uncertainties in all quantities, including the forecast.

The method is described in detail in Nielsen and Berg (2017; WD6 of the ICES WKPOUT 2017), and the source code, input data and output is available online at www.stockassessment.org under "NorPoutBench2016", and for the current September 2024 assessment under "NP_Sep2024_v2" at the same website.

In brief, the model is the same as the SAM model, except that the time-step used is one quarter of a year rather than a full year. Recruitment is assumed to occur in quarter 3 only. The logarithm of the fishing mortality-at-age and quarter is assumed to follow a multivariate random walk with lag 4 and correlated increments, i.e. the log F-at-age in a given quarter is given by the log F-vector in the same quarter one year earlier plus a correlated noise term with mean zero.

The observation equations in SESAM are also extended to deal with zero observations (both surveys and catches), which are usually treated as missing values in SAM. This is done by introducing a detection limit for each fleet, and defining the likelihood of a zero observation to be the probability of obtaining a value less than the detection limit. The detection limit is set to 0.5 times the smallest positive observation by fleet.

A special option is included to down-weight the influence of large jumps in log F on the estimated random walk variance due to periods where the fishery was closed. This option reduces the estimated log F process variance considerably.

In the ICES WKPOUT (2017) benchmark, a number of variants of the SESAM model were investigated and compared to the previous assessment model, SXSA. These variants included the use (or not) of commercial CPUE data, omission of the earliest years of data from the assessment, alternative settings for the detection threshold used to manage zero-valued data, and omitting the years of fishery closure when estimating the random walk variance on fishing mortality.

The final SESAM model also used in this September 2024 assessment excludes commercial CPUE data, omits 1983 data from the assessment, use age 3+-group, and omits the years of fishery closure from the random walk variance calculation. In relation to evaluation of stock sustainability and forecast, B_{lim} is set equal to B_{loss} based on quarter 4 SSB values to align with the new fishing season (1 November to 31 October). The short-term forecast is stochastic, which allows the probability of SSB being below B_{lim} to be evaluated immediately following the fishing season.

Stock indices and assessment settings used in the assessment are presented in Tables 12.3.1–12.3.2.

Results of the SESAM analysis are presented in Tables 12.3.1–12.3.2 (assessment model parameters, settings, and options), Table 12.3.3 (population numbers-at-age; recruitment), Table 12.3.4 (fishing mortalities by year and quarter), Table 12.3.5 (diagnostics), and Table 12.3.6 (stock summary). The summary of the results of the assessment are shown in Table 12.3.6 and Figures 12.3.1 (spawning-stock biomass, SSB), 12.3.2 (total-stock biomass, TSB), 12.3.3 (fishing mortality, F_{bar}), 12.3.4 (recruitment), 12.3.5 (yield, observed and predicted catches on yearly and quarterly basis), and 12.3.6–12.3.7 (stock–recruitment plots for quarter 1 and quarter 3, respectively). The retrospective patterns and the residuals from the SESAM September 2024 assessment are given in Figure 12.3.8 and Figures 12.3.9–12.3.11, respectively.

Fishing mortality has generally been lower than natural mortality and has decreased in the recent 20 years below the long-term yearly average (0.30, Tables 12.3.4 and 12.3.6). Fishing mortality for the 1st and 2nd quarter has in general decreased in recent years, while fishing mortality for 3rd and 4th quarter, that historically constitutes the main part of the annual F – and here especially 4th quarter in most recent years, has also decreased moderately during the last 20 years. Fishing mortality in 2005, first part of 2006, 2007, 2008, 2011, and in first part of 2012 was close to zero due to the closure of the Norway pout fishery in those periods. Fishing mortality was moderate in 2009 and 2010 as well as in second half 2012 and in 2013–2023, and the TACs have not been fished up in any of these recent years. In recent years, the quota uptake has been below 35% (see Nielsen *et al.*, 2016), and in 2019 the quota uptake was below 75%, below 80% in 2020, below 35% in 2021–2022, and below 25% in 2023. The low TAC of 6 kt in 2011 was taken in second half year resulting in a very low F in 2011.

Spawning-stock biomass (SSB) has since 2001 decreased continuously until 2005 but has in recent years increased again due to the strong 2008, 2009, 2012, 2014, 2016, 2018, 2019 and 2020 year classes as well as the about long-term average recruitment in 2022, and the lowered fishing mortality. The stock biomass fell to a level well below B_{lim} in 2005 which is the lowest level ever recorded. By 1 January 2007 and 2008 the stock was at B_{pa} (= MSY $B_{escapement}$; i.e. at increased risk of suffering reduced reproductive capacity), while the stock by 1 January 2009-2012 and by 1 January 2014-2024 has been above B_{pa} (i.e. the stock show full reproductive capacity).

The recruitment in 2010 was very low and at the same level as the low 2003- and 2004-year classes where these three-year classes are the lowest on record since the mid-1980s. The recruitment in 2008, 2009, 2012, 2014, 2016, 2018, 2019 and 2020 was high. Recruitment in 2011 and 2013 was also very low, and the recruitment in 2015, 2017, 2021 and 2023 was below long-term average (48 billion), but because of the strong 2012, 2014, 2016, 2018, 2019- and 2020-year classes and the about average 2022 year class the SSB has been well above B_{pa} (= MSY $B_{escapement}$) by 1 January 2014-2023 even with a high yearly TAC in 2014–2022 (up to 3rd quarter) considering growth, high natural mortality, and 20% maturation at age 1. The recruitment in 2023 and 2024 is very low, and the 2021 recruitment was about half (23 billion) of the long-term average (48 billion) and has reduced the stock biomass, but because of the strong 2020 and average 2022 recruitment the stock is expected to remain above B_{pa} by the end of 2024.

12.3.3 Comparison with 2015–2023 assessments

The final, accepted September 2015 SXSA assessment run was compared to the inter-benchmark May 2012 and the update September 2014 and May 2014 Scenario 2 SXSA assessments. The result of the comparative runs between the September 2015 and the September 2014 and May 2014 assessments are shown in the ICES WGNSSK 2015 Report. The resulting outputs of these assessments were shown to be identical giving similar perception of stock status and dynamics.

The WKPOUT 2016 benchmarking comparison of the SESAM and SXSA May 2014 assessments are presented in the ICES WKPOUT 2016 Report (ICES, 2017). The overall conclusions were that the two assessments give the same perception of stock dynamics with respect to abundance (SSB) and recruitment over time. There was some variability of the estimates of fishing mortality especially in the middle of the assessment period, however, the SXSA estimates lies within the confidence intervals of the SESAM estimates of fishing mortality.

In Figures 12.3.1, 12.3.3 and 12.3.4 the SESAM September 2024 assessment estimates of spawning-stock biomass, fishing mortality, and recruitment are shown, respectively, compared with the corresponding SXSA May 2014 assessment estimates. It also appears from this comparison that the conclusions are the same as above for the comparison of the two 2014 assessments, i.e. that the two assessments give the same perception of stock dynamics.

The retrospective analysis based on the SESAM September 2024 assessment is shown in Figure 12.3.8. There is a tendency towards the retrospective analyses do not fully converge although being at the same level and showing the same perceptions of the stock dynamics. For the latest years it converges for SSB, but for a few previous years to this the convergence is not as high. No strong retrospective patterns are observed for SSB, and the Mohns rho values are below the threshold of +/- 0.3 for short lived species. For the most recent years the convergence is high for SSB (Mohn's rho -2%) and for all years the retrospective patterns are within the confidence limits of the estimates for both SSB, F and R, except for F in 2023 (Figure 12.3.8). There is a tendency that the assessment overestimate terminal Fs (Mohn´s rho 19%), and accordingly the Fs for previous years are downscaled. The catches in 2022-2024 have been low, and the assessment perceives this in the fishing mortalities. The SESAM model is sensitive to changes in seasonal fishing patterns. Usually, the 4th quarter catches are higher than the 1st, 2nd and 3rd quarter catches, respectively, but the catches in 4th quarter 2023 were very low only about one third of the catches in 3rd quarter 2023. There is a strong positive retrospective pattern for recruitment with a tendency to overestimate recruitment in the terminal assessment year (Mohn's rho 88%). This is partly due to not full consistency between in-year-0-group indices and 1-group-indices the following year for the EGFS and SGFS Q3 surveys. The current assessments have downscaled the strong 2022 year class, and the recruitment in 2023 and 2024 is very low. It should be noted that there is some difference between estimates of the B_{loss} level in the start of Q4 in 2005 between assessments.

12.3.4 Historical stock trends

The assessment and historical stock performance is consistent with previous years' assessments, i.e. the perception of stock dynamics of the SSB, the fishing mortality for ages 1 and 2 and recruitment over time are consistent. However, there is in general a tendency to overestimate recruitment in the terminal assessment year. According to the benchmark assessments, the SXSA estimates of fishing mortality is within the confidence limits of the SESAM estimates of fishing mortality, which is generally also the case for the September 2024 assessment, except for the 2023 F. In the latest assessment, the Mohn's rho on F is 19% (see further comments on this in Section 12.3.3 above and further below in Section 12.3.4).

Based on the inter-Benchmark in spring 2012 with revised estimates of natural mortality, maturity-at-age and mean weight at age for the stock in the assessment there was observed a consistent (over time) slight increase in SSB (because 20% of the age group 1 is considered mature compared to 10 % in the previous assessments), and a consistent slight decrease in recruitment and total-stock biomass compared to previous years mainly because of the revised natural mortality by age and quarter. This is shown in the ICES IBPNorwayPout Report (ICES, 2012b) and the Stock Annex.

There has been a smaller consistent decrease in $F_{bar(1-2)}$, because of the introduction of the revised IBTS Q1 and Q3 index time-series for Norway pout of all age groups in 2020 (Brooks and Nielsen, 2020). The changes are not affecting TSB (Total-stock biomass) and recruitment very much. This is because the changes have been relatively higher for the indices of the older mature age groups in the population.

Recruitment estimates

The long-term average recruitment (age 0, second quarter) is 48 billion (arithmetic mean) for the period 1984–2024 (Table 12.3.6). Recruitment is highly variable and influences SSB and TSB rapidly due to the short lifespan of the species and because 20% reach maturity as 1-group. The recruitment reached historical minima in 2003–2004 as well as in 2010. The recruitment in 2008, 2009, 2012, 2014, 2016, 2018, 2019 and 2020 was high and about long-term average in 2022. Recruitment in 2011 and 2013 was very low, and the recruitment in 2015, 2017, 2021, 2023 and 2024 has been below long-term average (48 billion).

12.4 Short-term forecast

The short-term forecast is stochastic based on the SESAM September 2024 assessment, which allows the probability of SSB being below B_{lim} to be evaluated immediately following the fishing season. The SESAM is, like the SXSA, a quarterly based model estimating biomass at the start of each quarter of the year.

Short-term projections are conducted as follows.

1. Assume values for M, weight-at-age in the catches and in the stock, and maturity-at-age for the projection period. Since all of those quantities except weight-at-age in the catches are assumed constant over time, only weight-at-age requires special treatment. A procedure for forecasting catch weights is described in ICES WKPOUT (2017, WD6, Nielsen and Berg, 2017), but see also below.
2. Draw K samples from the joint posterior distribution of the states (log N and log F) in the last year with data, and the recruitment in all years.
3. Assume that log Ft = log Ft-4 + log Gt, for all future values of t where Gt is some chosen vector of multipliers of the F-process. If Gt = 1 for all t this corresponds to assuming the same level and quarterly pattern in F for all future time-steps as in the last data year.
4. Create K forecasting trajectories starting from the samples of joint posterior distribution of the states. This is done by sampling K recruitments from the vector of historic recruitments obtained in step 2, and then projecting the states forward in time using the stock equation with randomly sampled process errors from their estimated distribution.

Each forecast is based on 4000 simulations where there is drawn by random from the vector of historic recruitments. In the forecast procedure there is made a forecast for each resampled recruitment by each simulation, and the median of the outputs are used. The median of the resampled recruitment values is approximately the same as the geometric mean of the vector of historic recruitment and represent the input recruitment in the forecast year. It should be noted that the short-term forecast only uses the observed 2024 recruitment (Q3 2024) in the SSB estimate by 4th quarter 2024. The recruits in 2025 do not become a part of SSB by 4th quarter (1 October) 2025 because they have not reached maturity yet by 4th quarter 2025 but will do that by 1 January 2026 (20% mature as 1-group here). However, the forecast is just run up to 4th quarter 2025, and the recruits in 2025 is accordingly not used (and shall not be that) in the forecast SSB estimate in Q4 2025.

5. Find Gt such that the 5th (or any other) percentile of the catches (total mass) in the projections equal some desired level such as B_{lim} (optional).

Forecasting weight-at-age in the catches

There is substantial variation in weight-at-age in the commercial catches from year-to-year, which means that usual methods of using running averages will be quite sensitive to the bandwidth of the running average. This is important since TAC estimates calculated in step 5 above depend directly on the catch weight-at-age.

The following model is used:

$$E(\sqrt{CW_{a,q,t}}) = \mu_{a,q} + s(cohort, a) + U_t$$

where μa,q is a mean for each combination of quarter and age, s( ) is tensor product smoothing spline, and U_t are normal distributed random effects. The square root transform is used to achieve variance homogeneity in the residuals. See Figure 1 in ICES WKPOUT (2017, WD6, Nielsen and Berg, 2017).

The projected mean weight at ages in the catch used in the forecast are shown in Table 12.6.1.

Forecasts

The first forecast provides a TAC advice according to a calculated yield in the forecast year where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5%, i.e. the forecast estimates the yield according to SSB that meets the 5% criterion at the B_{lim} date which is 1 October as explained in Sections 12.1.4, 12.6 and 12.9. The purpose of the first forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled such that the fifth percentile of the SSB distribution one year a head (1 October 2025) equals B_{lim}, i.e. where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5%. The results of the forecast are presented in Table 12.6.2 and Figure 12.6.1, and this results in a catch up to 0 kt (40 t) in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.001 and a SSB at 47 kt (46 796 t) by 1 October 2025. It should be noted that even with a zero catch it is not possible to obtain a SSB 5th quantile that is at B_{lim}, and accordingly the advice will be a zero catch (0 t) and zero fishing mortality ($F_{bar(1–2)}$ of 0.000) resulting in a SSB of 47 kt (46 831 t) – see forecast below.

The purpose of the second forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to zero. The results of the forecast are presented in Table 12.6.3 and Figure 12.6.2 resulting in no catch in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.000 and a SSB at 47 kt (46 831 t) by 1 October 2025.

The purpose of the third forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to F status quo for previous year up to 1 October 2024. The results of the forecast are presented in Table 12.6.4 and Figure 12.6.3 where catches up to 6 kt (5 760 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.075 and a SSB at 44 kt (43 689 t) by 1 October 2025.

The purpose of the fourth forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled such that the median of the SSB distribution one year a head (1 October 2025) equals B_{lim}. The results of the forecast are presented in Table 12.6.5 and Figure 12.6.4 where catches up to 8 kt (7 705 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.102 and a SSB of 43 kt (42 573 t) by 1 October 2025.

The purpose of the fifth forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled such that the median of the SSB distribution one year a head (1 October 2025) equals B_{pa}. The results of the forecast are presented in Table 12.6.6 and Figure 12.6.5 where catches up to 0 kt (0 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.000 and a SSB of 47 kt (46 796 t = B_{pa}) by 1 October 2025. It should be noted that even with a zero catch it is not possible to obtain a SSB median that is at B_{pa}.

The purpose of the sixth forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.2, i.e. with a F_{cap} = 0.2. The results of the forecast are presented in Table 12.6.7 and Figure 12.6.6 where catches up to15 kt (14 770 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.203 and a SSB of 39 kt (38 695 t) by 1 October 2025.

The purpose of the seventh forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.3, i.e. with a F_{cap} = 0.3. The results of the forecast are presented in Table 12.6.8 and Figure 12.6.7 where catches up to 21 kt (21 338 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.304 and a SSB of 35 kt (35 475 t) by 1 October 2025.

The purpose of the eight forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.4, i.e. with a F_{cap} = 0.4. The results of the forecast are presented in Table 12.6.9 and Figure 12.6.8 where catches up to 28 kt (27 359 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.406 and a SSB of 33 kt (32 788 t) by 1 October 2025.

The purpose of the ninth forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.5, i.e. with a F_{cap} = 0.5. The results of the forecast are presented in Table 12.6.10 and Figure 12.6.9 where catches up to 33 kt (32 860 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.507 and a SSB of 30 kt (30 476 t) by 1 October 2025.

The purpose of the tenth forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.6, i.e. with a F_{cap} = 0.6. The results of the forecast are presented in Table 12.6.11 and Figure 12.6.10 where catches up to 38 kt (37 894 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.609 and a SSB of 28 kt (28 131 t) by 1 October 2025.

The purpose of the elleventh forecast is to calculate the catch of Norway pout from 1 October 2024 to 31 October 2025 with F scaled to 0.7, i.e. with a F_{cap} = 0.7. The results of the forecast are presented in Table 12.6.12 and Figure 12.6.11 where catches up to 43 kt (42 659 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.710 and a SSB of 26 kt (26 152 t) by 1 October 2025.

According to the long-term management strategy evaluation based on the joint EU-Norway request from November 2017 and the resulting released advice by ICES in May 2018 evaluating long-term management strategies for Norway pout in area 4 and 3.a (ICES WKNPOUT, 2018) it was shown that the current procedure for providing TAC advice for Norway pout, based on an escapement strategy where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5% is only precautionary with the addition of an F_{cap} at 0.7. See also Sections 12.1.4, 12.6, and 12.9.

12.5 Medium-term projections

No medium-term projections are performed for this stock. The stock contains only a few age groups and is highly influenced by recruitment.

12.6 Biological reference points

As explained in the ICES WKPOUT 2016 Report (ICES, 2017), Section 3.8, the benchmark has recommended that the B_{lim} = B_{loss} should be the lowest SSB estimated in quarter 4, because this is closest to the beginning of the fishing season (1 November), and would be the most appropriate to use as a B_{lim} reference point, because the probability of SSB being below B_{lim} can then be evaluated immediately after the fishing season for which a TAC is being calculated. It was argued that the quarter 4 SSB (an existing output of the SESAM model) was adequate for this purpose because any attempt to calculate an SSB corresponding to 1 November would require further assumptions and would effectively only be an interpolation between the quarter 4 and subsequent quarter 1 SSBs, thus unnecessarily complicating the calculation of the SSB. The forecast provides a TAC advice according to a calculated yield in the forecast year where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5%, i.e. the forecast estimates the yield according to SSB that meets the 5% criterion at the B_{lim} date which is 1 October. Accordingly, it is recommended that this TAC is used for the management year 1 November–31 October. This is an approximation and will be sustainable unless radical changes occur in the seasonal fishing pattern used in the forecast. In the period between 1 October and 1 November in the forecast year there will be provided a new assessment.

In Table 12.6.13, quarterly minima of the estimated SSB time-series (1984–2016) are shown from the SESAM Benchmark Assessment Baseline Run from the Norway pout benchmark assessment in ICES WKPOUT (2017). The estimates are quarterly minima estimated at the beginning of the season. The lowest observed biomasses in the assessment period are in 2005. The estimates are B_{loss} estimates which equals B_{lim} according to the ICES WKPOUT 2016 benchmark assessment which by 1 October is B_{lim} = 39 450 t (ICES, 2017). In Table 12.6.14, the same minima for the same period are shown using the new IBTS Q1 and Q3 survey indices introduced in the assessment from 2020 onwards. See also Sections 12.1.4 and 12.9.

The B_{lim} SSB estimate in Q4 is low because of the 0-group and many of the 1-group fish are not in the SSB yet at that time. However, in the forecast there is a change in maturity and an age-class shift by 1 January, i.e. the 0-group becomes 1-group and 20% of those become mature, and the 1-group becomes 2-group and 100% of those become mature. This is in the forecast calculated into the SSB available for spawning in 1 quarter of the forecast year.

The fishing pattern has not changed significantly in the most recent years. Accordingly, the use of B_{lim} by Q4 should be sustainable.

It should be noted that there is a tendency towards the retrospective analyses for SSB do not fully converge although being at the same level (see also Sections 12.3.3 and 12.3.4 above). It should also be noted that there is quite some difference between estimates of the B_{loss} level in the start of Q4 in 2005 between assessments.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{escapement}$	Not defined*		
	F_{MSY}	Not defined		
	F_{cap}	0.70	A long-term management strategy evaluation, indicating that an escapement strategy for Norway pout is only precautionary with the addition of an upper limit on fishing mortality = F_{cap} ($F_{bar[1–2]}$) at 0.7	Brooks and Nielsen (2020)
Precautionary approach	B_{lim}	42 573 tonnes (4th quarter)	B_{lim} = B_{loss}, the lowest observed biomass in 2005 (as estimated in the updated benchmark assessment)	Brooks and Nielsen (2020)

Framework	Reference point	Value	Technical basis	Source
	B_{pa}	69 736 tonnes (4th quarter)	$B_{pa} = B_{lim}\ e^{0.3 \times 1.645}$	Brooks and Nielsen (2020)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not applicable		
	F_{MGT}	Not applicable		

*** MSY $B_{escapement}$ has not been defined, as the escapement strategy uses directly the 95% probability of SSB being above B_{lim}.**

No F-based reference points are advised for this stock except for an F_{cap} (see below and Sections 12.1.4 and 12.9).

Norway pout is a short-lived species and most likely a one-time spawner. The population dynamics of Norway pout in the North Sea and Skagerrak are very dependent on changes caused by recruitment variation and variation in predation (or other natural) mortality, and less by the fishery. Recruitment is highly variable and influences SSB and TSB rapidly due to the short lifespan of the species. (Basis: Nielsen *et al.*, 2012; Sparholt *et al.*, 2002a,b; Lambert *et al.*, 2009). Furthermore, 20% of age 1 is considered mature and is included in SSB (Lambert *et al.*, 2009). Therefore, the recruitment in the year after the assessment year does influence the SSB in the following year. Also, Norway pout is to limited extent exploited already from age 0. Overall, the stock is very dependent of yearly dynamics and should be managed as a short-lived species.

On this basis, advice on yield in the forecast year where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5% is considered sustainable. That is where F is scaled such that the fifth percentile of the SSB distribution one year a head (1 October in forecast year) equals B_{lim}. According to the long-term management strategy evaluation based on the joint EU-Norway request from November 2017 and the resulting released advice by ICES in May 2018 evaluating long-term management strategies for Norway pout in area 4 and 3.a (ICES WKNPOUT, 2018) it was shown that the current procedure for providing TAC advice for Norway pout, based on an escapement strategy where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5% is only precautionary with the addition of an F_{cap} at 0.7 (see also Sections 12.1.4 and 12.9).

B_{pa} has been calculated from

$$B_{pa} = B_{lim}\ e^{0.3*1.645}\ (SD).$$

A SD estimate around 0.3–0.4 is considered to reflect the real uncertainty in the assessment. This SD-level also corresponds to the level for SD around 0.2–0.3 recommended to use in the manual for the Lowestoft PA Software (Cefas, 1999). The relationship between the B_{lim} and B_{pa} (42 573 and 69 736 t) is 0.6.

It is obvious that the Norway pout, being a short-lived species, has no well-defined breakpoint (inflection) in the SSB-R relationship (ICES IBPNorwayPout 2012b; ICES WKPOUT, 2017) and therefore there is no clear point at which impaired recruitment can be considered to commence (i.e. SSB does not impact R negatively, and that there is a relatively high recruitment observed at B_{loss} as well as more observations above than below the inflection point).

The $B_{lim} = B_{loss}$ = 42 573 t (quarter 4) is based on the lowest observed SSB in 2005 providing good recruitment.

Revision of Reference points in 2020

Due to introduction of revised IBTS (International Bottom Trawl Survey) quarter 1 (Q1) and quarter 3 (Q3) indices for the full survey time-series for all age groups of Norway pout by ICES in 2020 (https://github.com/ices-tools-prod/DATRAS/tree/master/ALK_substitution) the long-term sustainability of the B_{lim} and F_{cap} = 0.7 reference points were during summer 2020 evaluated during and inter-benchmark and presented in Brooks and Nielsen (2020).

The analyses showed a slight change in B_{lim} of less than 10% from B_{lim} = 39 447 t (Benchmark ICES WKPOUT, 2017 estimate) to B_{lim} = 42 573 t by running the benchmark assessment with the new IBTS indices (Brooks and Nielsen, 2020).

Furthermore, Brooks and Nielsen (2020) evaluated harvest control rules (HCRs) within the escapement strategy currently practiced (aimed at retaining a minimum stock size in the sea every year after fishing) that are based on the new B_{lim} value and simulated to be restricted by a combination of an upper limit on F values (F_{cap}), different F_{max} values (between the historical observed F_{max} of 0.67, i.e. the $F_{historical}$ for the assessment using the revised IBTS data, and up to a F_{max} value of 2) as well as different TAC upper bounds (TAC_{max}) for setting the TAC. The TAC_{max} values evaluated was from 200 kt up to infinite (i.e., with no upper TAC bound). The sustainability of the current F_{cap} = 0.7 was evaluated through long-term management strategy evaluation simulations with the new B_{lim} reference point and according to the different F_{max} and TAC_{max} values applied as described above and detailed in Brooks and Nielsen (2020)

These evaluations showed that the currently implemented F_{cap} of 0.7 is also precautionary and sustainable with the slightly revised B_{lim} reference point (Brooks and Nielsen, 2020).

This is the case also in extremely unrealistic scenarios of an infinite TAC_{max} and with F_{max} values between 0.67 and up to 2 (Brooks and Nielsen, 2020). All scenarios for F_{max} = 0.67 and for a very unrealistic high F_{max} = 1 with infinite TAC_{max} are sustainable. Even with the unrealistically high maximum implementable F of 2 then the risk only goes above 0.05 with an F_{cap} = 0.7 (when rounded to the nearest 0.01 units) for the risk3.long.Q4. All other scenarios for F_{max} = 2 values are sustainable (Brooks and Nielsen, 2020). This means that if there were an unrealistic high F_{max} of around 1.6 which is similar to the natural mortality level for the stock then all scenarios of F_{cap} = 0.7 would obviously be sustainable.

The WGNSSK working group has on this basis decided to switch to the new B_{lim} reference point, and on this basis to calculate a new B_{pa} reference point, and continue with the currently implemented F_{cap} of 0.7. It should again be noted that no lower bound TAC_{min} or upper bound TAC_{max} boundaries have been implemented in the management (see also Sections 12.1.4 and 12.9).

In Table 12.6.13 quarterly minima of the estimated SSB time-series (1984–2016) according to recruitment are shown from the SESAM updated Benchmark Assessment Run (Run: NP_Sep17_fixC_Benchmark2016Data_NewIBTS, www.stockassessment.org) with new IBTS Q1 and Q3 survey indices for Norway pout made available in 2020 (Brooks and Nielsen, 2020). The estimates are quarterly minima estimated at the beginning of the season. The lowest observed biomasses providing a good year class in the assessment period are still in 2005. The estimates are B_{loss} estimates which equals B_{lim} which by 1 October is B_{lim} = 42 573 t, i.e. based on the lowest observed SSBs in 2005.

12.7 Quality of the assessment

The estimates of the SSB, recruitment and the average fishing mortality of the 1- and 2-group are consistent with the estimates of previous year's assessment, except that SSB has decreased because of introduction of the survey Q1 and Q3 indices in 2024 (see Sections 12.1.4, 12.6 and 12.9). The overall perception of stock dynamics with respect to abundance (SSB), fishing mortality and recruitment over time is the same. The estimates of Mohn's Rho in the retrospective analyses are of the baseline SESAM assessment September 2024, with terminal assessment year ranging from 2017–2024, is -2% for SSB, 19% for F_{bar}, and 88% for R shown in Figure 12.3.8. However, there is a tendency that the assessment overestimate terminal Fs (Mohn´s rho 19%), and accordingly the Fs for previous years are downscaled. The catches in 2022-2024 have been low, and the assessment perceives this in the fishing mortalities. The SESAM model is sensitive to changes in seasonal fishing patterns. Usually, the 4th quarter catches are higher than the 1st, 2nd and 3rd quarter catches, respectively, but the catches in 4th quarter 2023 were very low only about one third of the catches in 3rd quarter 2023. Despite these tendencies, then the terminal year estimates lie within the confidence limits of the model estimates except for F in 2023 which appear from Figure 12.3.8 (see also Sections 12.3.3 and 12.3.4 above).

The assessment is considered appropriate to indicate trends in the stock and immediate changes in the stock because of the assessment considering the seasonality in fishery, use of seasonal based fishery-independent information, and using most recent information about recruitment. The assessment provides stock status and year-class strengths of all year classes in the stock up to the end of third quarter of the assessment year. The assessment method gives a good indication of the stock status the 1 October the following year based on projection of existing recruitment information in 3rd quarter of the assessment year.

12.8 Status of the stock

Based on the estimates of SSB in September 2024, ICES classifies the stock at full reproductive capacity.

With F scaled such that the fifth percentile of the SSB distribution one year a head (1 October 2025) equals B_{lim}, i.e. where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5% catches up to 0 kt (0 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1–2)}$ of 0.000 and a SSB at 46 831 t by 1 October 2025. It should be noted that even with a zero catch it is not possible to obtain a SSB 5th quantile that is at B_{lim}, and accordingly the advice will be a zero catch (0 t) and zero fishing mortality ($F_{bar(1–2)}$ of 0.000) resulting in a SSB of 47 kt (46 831 t). This is due to the strong 2020 recruitment being above the long-term average recruitment (48 billion), a 2021 recruitment around half (23 billion), and a 2022 recruitment around average (45 billion) of the long-term average, growth of the stock and still taking into consideration the high natural mortality as well as the short lifespan of the stock.

Fishing mortality has generally been lower than the natural mortality for this stock and has decreased in recent years below the long-term average F (0.30). If the advised catch is taken, the F is expected stay well below this average for the period 1 October 2024 to 31 October 2025. Targeted fishery for Norway pout was closed in 2005, first half year 2006, in all of 2007, as well as in first half of 2011 and 2012 and fishing mortality and effort has accordingly reached historical minima in these periods (Table 12.3.6). The fishery was open for the second half 2006, 2011 and 2012 as well as in all of the years 2008–2010 and 2013–2023. Here, the fishing mortality was low in 2008 and 2011 and moderate in 2009 and 2010 as well as in second half 2012 and in 2013-2023, but still below the long-term average. The TACs have not been fished up in any of these recent years. Less than 75% of the quota was taken in 2019, less than 80% in 2020, less than 35% in 2021-2022 and less than 25% in 2023.

The recruitment reached historical minima in 2003–2004, and the 1987, 2002, 2006, and 2010 year classes were weak. The recruitment in 2008, 2009, 2012, 2014, 2016, 2018, 2019 and 2020 was high well above the long-term average (48 billion). Recruitment in 2011, 2013 and 2023-2024 was also very low, while the recruitment in 2022 was about long-term average, and the 2015, 2017, and 2021 recruitment has been below the long-term average (Table 12.3.6).

12.9 Management considerations

There are no management objectives for this stock.

From the results of the forecast presented here with a F scaled such that the fifth percentile of the SSB distribution one year a head (1 October 2025) equals B_{lim}, i.e. where the probability of SSB being below B_{lim} by 1 October in the forecast year is less than 5% catches up to 0 kt (40 t) can be taken in the directed Norway pout fishery in the period 1 October 2024 to 31 October 2025 which corresponds to a $F_{bar(1-2)}$ of 0.001 and a SSB at 47 kt (46 796 t) by 1 October 2025. It should be noted that even with a zero catch it is not possible to obtain a SSB 5th quantile that is at B_{lim}, and accordingly the advice will be a zero catch (0 t) and zero fishing mortality ($F_{bar(1-2)}$ of 0.000) resulting in a SSB of 47 kt (46 831 t). This is due to the strong 2020 recruitment being above the long-term average recruitment (48 billion), and a 2021 recruitment around half (23 billion) and a 2022 recruitment around average (45 billion) of the long-term average, growth of the stock and still taking into consideration the high natural mortality as well as the short lifespan of the stock.

Norway pout is a short-lived species and most likely a one-time spawner. The population dynamics of Norway pout in the North Sea and Skagerrak are very dependent on changes caused by recruitment variation and variation in predation (or other natural) mortality, and less by the fishery. Recruitment is highly variable and influences SSB and TSB rapidly due to the short lifespan of the species. (Basis: Nielsen *et al.*, 2012; Sparholt et al., 2002a,b; Lambert *et al.*, 2009). Furthermore, 20% of age 1 is considered mature and is included in SSB (Lambert *et al.*, 2009). Therefore, the recruitment in the year after the assessment year does influence the SSB in the following year. Also, Norway pout is to limited extent exploited already from age 0. Overall, the stock is very dependent of yearly dynamics and should be managed as a short-lived species.

There is a need to ensure that the stock remains high enough to provide food for a variety of predator species. Natural mortality levels by age and season used in the stock assessment reflect the predation mortality levels estimated for this stock from the recent multispecies stock assessment performed by ICES (ICES WGSAM, 2014; 2011; ICES SGMSNS, 2006). Biological interactions with respect to intraspecific and interspecific relationships for Norway pout stock dynamics and important predator stock dynamics have been reviewed and further analysed in Nielsen (2017; Section 6) and there is referred to the general conclusions here.

Existing technical measures such as the closed Norway pout box, minimum mesh size in the fishery, and bycatch regulations to protect other species have been maintained. An overview of recent relevant management measures and regulations for the Norway pout fishery and the stock can be found in Nielsen *et al.* (2017) and in the Stock Annex.

Historically, the fishery includes bycatches especially of haddock, whiting, saithe, and herring. Existing technical measures to protect these bycatch species should be maintained or improved. Bycatches of these species have been relatively low in the recent decade, and in general, the bycatch levels of these gadoids have decreased in the Norway pout fishery over the years. The declining tendency of bycatch of other species in the Norway pout fishery also appears from Table 12.2.1. However, here it can also be observed, that the bycatches have increased slightly in 2019 and 2020 compared to previous years and to 2021–2023 where bycatches were again low From April 2020 onwards, the sampling intensity of the Danish Norway pout fishery has increased where every landing is now sampled, and the number of required samples increase with the landing weight from a minimum of 6 to a maximum of 24 per landing. This new sampling system may give more precise estimates of bycatches which should be evaluated in future benchmark assessments.

Sorting grids in combination with square mesh panels have been shown to reduce bycatches of whiting and haddock by 57% and 37%, respectively (Eigaard and Holst, 2004; Nielsen and Madsen, 2006; Eigaard and Nielsen, 2009; Eigaard *et al.*, 2012). Sorting grids are at present used in the Norwegian and Danish fishery (partly implemented as management measures for the larger vessels), but modification of the selective devices and their implementation in management is still ongoing. In Eigaard *et al.* (2021) a new bycatch reduction device, termed "Excluder", is presented as an alternative to a traditional rigid sorting grid, mandatory in the small-meshed Norway Pout trawl fishery in the North Sea. For all bycatch species analysed in Eigaard *et al.* (2021), the Excluder had significantly lower catches relative to the grid: herring (21%), whiting (6%), mackerel (5%), American plaice (70%), witch flounder (15%), and lesser silver smelt (71%). For Norway Pout there was a significant increase in the overall catch efficiency of 32%. These results are explained by a 10 cm smaller L50 (the length of fish with 50% probability of being rejected by the sorting system) of the Excluder and a 15 times larger sorting area, which reduces the risk of clogging and loss of function. The excluder has been implemented in the EU fishing zone from January 2022, so it is optional to choose between sorting grid or excluder. ICES suggests that these devices (or modified forms of those) are fully implemented and brought into use in the fishery. The implementation of these technical measures shall be followed up by adequate control measures of landings or catches at sea to ensure effective implementation of the existing bycatch measures. An overview of recent relevant management measures and regulations for the Norway pout fishery and the stock can be found in Nielsen *et al.* (2017) and in the Stock Annex.

12.9.1 Long-term management strategies

ICES has evaluated and commented on three management strategies in 2007, following requests from managers – fixed fishing mortality (F = 0.35), Fixed TAC (50 000 t), and a variable TAC escapement strategy. The 2007 evaluation showed that all three management strategies are capable of generating stock trends that stay at or above B_{pa} = MSY $B_{escapement}$, i.e. away from B_{lim} with a high probability in the long-term and are, therefore, considered to be in accordance with the MSY and precautionary approach. ICES does not recommend any particular one of the strategies.

The choice between different strategies depends on the requirements that fisheries managers and stakeholders have regarding stability in catches or the overall level of the catches. The variable TAC escapement strategy as evaluated in 2007 has higher long-term yield compared to the fixed fishing mortality strategy (and the fixed TAC strategy), but at the cost of a substantially higher probability of having closures in the fishery. If the continuity of the fishery is an important property, the fixed F (equivalent to fixed effort) strategy will perform better.

There should be no shift in management strategies between years. In recent years, the escapement strategy has been practiced.

A detailed description of these long-term management strategies and management plan evaluations can be found in the Stock Annex and in the ICES AGNOP 2007 (ICES CM 2007/ACFM:39), ICES WGNSSK 2007 (ICES CM 2007/ACFM:30, Section 5.3) and the ICES AGSANNOP (ICES CM 2007/ACFM:40) reports as well as in Vinther and Nielsen (2012, 2013).

ICES has again in September–October 2012 and April–May 2013 (Vinther and Nielsen, 2012; 2013) evaluated and commented on long-term management strategies for the stock using updated stock information. In September 2012, ICES evaluated 3 additional management strategies within the escapement strategy (Vinther and Nielsen, 2012): 1) A long-term minimum TAC > 0 together with a maximum TAC (only with one yearly assessment in September) with the result that a minimum TAC up to 27 kt (revised to 20 kt in the 2013 evaluation) and a maximum TAC of 100–250 kt will be long-term sustainable; 2) A long-term fixed initial TAC the first 6 months of the year followed by an date where the TAC for the whole year is set based on a fixed F (only with one yearly September assessment) with the result that an initial TAC between 25–50 kt and a fixed F = 0.35 (corresponding to median catch of 60 kt) is long-term sustainable; 3) Similar to 2, but here with a within year update assessment and advice based on the escapement strategy, and the result here is that an initial TAC of up to 50 kt is sustainable when having a within year update assessment. The difference between the MSE 1 and 2–3 is that the initial fixed TAC is assumed to be taken (or possibly lost) within the first six months of the year (MSE 2–3), while the minimum TAC in MSE 1 can be applied all year. As a follow up on this, ICES evaluated in April 2013 one additional management strategy within the escapement strategy (Vinther and Nielsen, 2013): 4) A long-term minimum TAC > 0 and a maximum TAC, but where the TAC year is from 1 November–31 October rather than from 1 January to 31 December, and one annual advice from the September assessment, with the result that a minimum TAC up to 20 kt with maximum TAC of 100 kt ($F_{max/cap}$ = 0.8) or with maximum TAC of 200 kt ($F_{max/cap}$ = 0.6) will be long-term sustainable with some level of F control according to those F_{cap} levels.

With the changes introduced by the August 2016 Norway pout benchmark assessment (ICES WKPOUT, 2017 and Annexes) involving change of assessment model, change of assessment year, change of assessment period, removal of the commercial fishery tuning fleet in the assessment, change of the plus-group in the assessment from 4+ to 3+ and change of stock MSY reference level these above previous MSEs cannot be used anymore for long-term management plans of the stock (including the F_{cap} estimates made there).

Long-term management strategy evaluation according to the new assessment and the revised reference levels as established from the benchmark assessment in August 2016, have been requested in a joint EU-Norway request from November 2017. Based on this EU / Norway request ICES on 29 May 2018 released its advice evaluating long-term management strategies for Norway pout in area 4 and 3.a (ICES WKNPOUT, 2018) which is based on the work from the ICES WKNPOUT (Report of the Workshop for Management Strategy Evaluation for Norway Pout, ICES, Copenhagen 26–28 February 2018, ICES CM2018/ACOM:38 Ref WGNSSK, 96 pp) as presented to the ICES WGNSSK and approved by ICES ACOM in May 2018.

ICES has evaluated sustainability of a range of harvest control rules (HCRs) within the escapement strategy currently used for Norway pout, with additional lower (TAC_{min}) and upper (TAC_{max}) bounds on TAC and optional use of upper fishing mortality values (F_{cap}). Several HCRs were identified that combined TAC_{min} in the range of 20 000–40 000 t and TAC_{max} less than or equal to 200 000 t (150 000 t or 200 000 t) and F_{cap} values of 0.3 and 0.4, resulting in no more than a 5% probability of the spawning-stock biomass falling below B_{lim}.

ICES has evaluated harvest control rules (HCRs) within the escapement strategy currently used (aimed at retaining a minimum stock size in the sea every year after fishing) that are restricted by a combination of TAC lower bounds (TAC_{min}) and upper bounds (TAC_{max}). For some HCRs, an upper limit on F (F_{cap}) is also used for setting the TAC.

Because of uncertainties in the estimate of the incoming year class, escapement strategies for short-lived species, where catch opportunities are very dependent on the strength of the incoming year class, may lead to a TAC where a too high portion is caught. ICES evaluations were conditioned by a maximum realized level of fishing mortality the fishery can exert (assumed at 0.89; $F_{historical}$), which means that the full TAC will not be taken if the required F to catch the TAC exceeds this value.

The identified combinations of TAC_{min} lower bound, TAC_{max} upper bound and F_{cap} give a less variable TAC and F from one year to the next, but also a lower long-term yield than the default escapement strategy. ICES is not in position to advise on this trade-off between higher yield and stability.

The results are sensitive to the assumption that the fishery stops catching Norway pout when F exceeds $F_{historical}$. Therefore, the HCR should be re-evaluated if future F exceeds $F_{historical}$ (0.89).

The evaluation showed that the current procedure for providing TAC advice for Norway pout, based on an escapement strategy is only precautionary with the addition of an F_{cap} at 0.7.

In consultations between EU and Norway, held on 5 and 6 September 2018, the advice was presented by ICES and in the following discussions, certain limited additional elements, to be reviewed by ICES, came up. This resulted in an additional EU / Norway request from September 2018 on evaluation of additional elements concerning the ICES advice evaluating long-term management strategies for Norway pout in area 4 and 3.a. Here ICES is requested to assess, following MSY $B_{escapement}$:

- which scenarios of TAC_{min} and TAC_{max} would be precautionary, if the F_{cap} is set at 0.7 (building on request part 2 and 3, pages 3 and 4 of the advice).
- which scenarios of TAC_{min} and TAC_{max} would be precautionary, if an interannual flexibility of +/-10% (both banking and borrowing) was introduced for Norway pout (building on request part 2 and 3, pages 3 and 4 of the advice, plus including precautionary scenarios with an F_{cap} of 0.7 – following from paragraph 1 of this request).

On this basis, ICES has evaluated additional harvest control rules (HCRs) within the escapement strategy currently used for Norway pout, with additional lower (TAC_{min}) and upper (TAC_{max}) bounds on TAC and use of an upper fishing mortality (F_{cap}) at 0.7. As for the scenario made for ICES May 2018 advice (ICES WKNPOUT, 2018), ICES evaluations were conditioned by a maximum realized level of fishing mortality the fishery can exert (assumed at 0.89; $F_{historical}$), which means that the full TAC will not be taken if the required F to catch the TAC exceeds this value.

This is presented in the ICES advice in ICES WKNPOUT (2018).
Several HCRs were identified that combined TAC_{min} in the range of 20 000–40 000 t and TAC_{max} less than or equal to 200 000 t, resulting in no more than a 5% probability of the spawning-stock biomass falling below B_{lim}. Increasing the F_{cap} from 0.4 (which was previously evaluated) to 0.7 results in a higher median and mean TAC, but also in a higher long-term probability of SSB falling below B_{lim}. It also results in a higher probability of being constrained by the TAC_{max}.

The evaluations and ACOM approval of this led to identification of an expanded set of sustainable scenarios with a F_{cap} of 0.7. Tables 1 and 2 in ICES WKNPOUT (2018) summarize the long-term (2023–2037) performance metrics for the (precautionary) combinations that result in no more than 5% probability of SSB falling below B_{lim} in the period 2023–2037. More detailed statistics for both precautionary and non-precautionary HCRs are shown in the Table 3 of this advice.

Given that Norway pout is short-lived and that the HCR scenarios are based on the escapement strategy, the application of an additional interannual quota flexibility of ±10% is not considered precautionary.

No decision on long-term management plans is currently available for the Norway pout in area 4 and 3.a based on the identified sustainable scenarios.

Due to introduction of revised IBTS (International Bottom Trawl Survey) quarter 1 (Q1) and quarter 3 (Q3) indices for the full survey time-series for all age groups of Norway pout by ICES in 2020 (https://github.com/ices-tools-prod/DATRAS/tree/master/ALK_substitution) the long-term sustainability of the B_{lim} and F_{cap} = 0.7 reference points were during summer 2020 evaluated and presented in Brooks and Nielsen (2020).

The analyses showed a slight change in B_{lim} of less than 10% from B_{lim} = 39 447 t (Benchmark ICES WKPOUT, 2017 estimate) to B_{lim} = 42 573 t by running the benchmark assessment with the new IBTS indices (Brooks and Nielsen, 2020).

Furthermore, the working document evaluated harvest control rules (HCRs) within the escapement strategy currently practiced (aimed at retaining a minimum stock size in the sea every year after fishing) that are based on the new B_{lim} value and simulated to be restricted by a combination of an upper limit on F values (F_{cap}), different F_{max} values (between the historical observed F_{max} of 0.67, i.e. the $F_{historical}$ for the assessment using the revised IBTS data, and up to a F_{max} value of 2) as well as different TAC upper bounds (TAC_{max}) for setting the TAC. The TAC_{max} values evaluated was from 200 kt up to infinite (i.e. with no upper TAC bound). The sustainability of the current F_{cap} = 0.7 was through long-term management strategy evaluation simulations evaluated with the new B_{lim} reference point and according to the different F_{max} and TAC_{max} values applied as described above and detailed in Brooks and Nielsen (2020).

These evaluations showed that the currently implemented F_{cap} of 0.7 is also precautionary and sustainable with the slightly revised B_{lim} reference point (Brooks and Nielsen, 2020).

This is the case also in extremely unrealistic scenarios of an infinite TAC_{max} and with F_{max} values between 0.67 and up to 2 (Brooks and Nielsen, 2020). All scenarios for F_{max} = 0.67 and for a very unrealistic high F_{max} = 1 with infinite TAC_{max} are sustainable. Even with the unrealistically high maximum implementable F of 2 then the risk only goes above 0.05 with an F_{cap} = 0.7 (when rounded to the nearest 0.01 units) for the risk3.long.Q4. All other scenarios for F_{max} = 2 values are sustainable (Brooks and Nielsen, 2020). This means that if there were an unrealistic high F_{max} of around 1.6 which is similar to the natural mortality level for the stock then all scenarios of F_{cap} = 0.7 would obviously be sustainable.

The WGNSSK working group has on this basis decided to switch to the new B_{lim} reference point, and on this basis to calculate a new B_{pa} reference point, and continue with the currently implemented F_{cap} of 0.7. It should again be noted that no lower bound TAC_{min} or upper bound TAC_{max} boundaries have been implemented in the management (see also Sections 12.1.4 and 12.6).

12.10 Benchmark issues

Recommendations for future assessments:

1. Age reading check and otolith exchange program

In July 2018, a report of the 2018 Norway Pout exchange was sent out by ICES WGBIOP, the first official SmartDots exchange (ICES WGBIOP, 2018). As decided upon by ICES WGBIOP each of the official exchanges will now have a full report, "Norway Pout Exchange 2018 Report" and a summary report, "Norway Pout Exchange 2018 Summary Report" for the stock assessment working group, in this case WGNSSK. This has been made available on the ICES SmartDots page late 2018 (see below) along with a link to download the data (ICES WGBIOP, 2018).

The reports have been produced by an R-script which uses output from the SmartDots database to run a standardized analysis based on the traditional Guus Eltink sheet, so all the tables and plots should look familiar. Not all of the plots produced have been commented upon in the text but have been included so they can be discussed in the relevant labs according to the routines there. (ICES WGBIOP, 2018).

The summary of the age reading check and otolith exchange program is given below. In 2015, a preliminary age reading exchange took place between the primary age readers of Norway pout from DTU Aqua (Denmark) and IMR (Norway) to identify if any age reading issues exist. The samples included in the exchange were from the commercial Norway pout fishery in the North Sea and Skagerrak-Kattegat areas (nop.27.3a4 stock) as age readings from this fishery are used directly in the Norway pout stock assessment to estimate catch, mean weight, maturity, and mortality-at-age. Here, 227 samples were selected from quarter 4, 2014 and quarter 3, 2015 covering the fish length range of Norway pout in the North Sea. Results showed an overall percentage agreement of 72%, with 100% agreement at age 0 and a decrease in agreement with an increase in age. Results showed a tendency for the Norwegian reader to estimate the ages of the fish to be one year older compared with the Danish reader. As Norway pout grow very quickly in the first year, the centre of the otoliths is highly opaque, and this can cause problems when identifying the first winter ring. In addition, subsequent growth zones are much narrower in comparison and the interpretation of growth zones towards the edge may also contribute to difficulties in age determination, especially for older fish. The exchange was conducted without the inclusion of otolith images and, thus, no record of which growth structures the readers identify when determining the age of the fish. These results indicated the need for a full-scale exchange to be conducted based on otoliths images and including all age reading laboratories who routinely read Norway pout.

The full-scale exchange was initially planned for 2016 and a timetable proposed which would allow for the results to be considered in relation to the 2017 stock assessment and potential interbenchmark Assessment if required. Due to difficulties with sample collection and the WebGR age reading platform delays were encountered. A revised timetable was proposed in line with the launch of the BETA version of the new age reading tool – SmartDots, making the results available for the Norway pout stock assessment in Spring 2018. The exchange took place from January to March 2018 and 14 readers from seven countries participated (Scotland, UK, France, Norway, Denmark, Netherlands, and Germany). Different methods were applied for age determination of this species; whole, broken, and sectioned otoliths and images were provided of samples prepared using each method. Samples were collected during the 2016 Q3 IBTS and 2014 Q4 commercial fishing trips from ICES area 27.4.a. covering the length range of the fish and considered adequately representative of the stock (ICES WGBIOP, 2018).

Results based on sectioned otoliths were exceptional with an overall percentage agreement based on modal age of 99% and an average CV of 3% (ICES WGBIOP, 2018). For the whole and broken otoliths, the average percentage agreement based on modal age is 82%, with an average CV of 20%. There is a slight tendency for some readers to overestimate the age at modal age 0 and 1 and underestimate compared with modal age 2. The bias that existed between the primary readers from Norway and Denmark in 2016 is still apparent. These results are based only on those readers who provide age data for assessment purposes (ICES WGBIOP, 2018).

In conclusion, there is an overall high level of agreement between readers of the Norway pout - nop.27.3a4 stock (ICES WGBIOP, 2018). The agreement is higher between the countries who read sectioned otoliths (Germany and UK-England) compared to those who read whole (Denmark) and broken otoliths (Denmark, Norway, and UK-Scotland). This can be partly attributed to one Norwegian and one Danish reader who occasionally overestimate compared with modal age 0 and 1 with the identification of the first winter ring being problematic. At modal age 2, there is a stronger tendency for readers to underestimate compared with modal age except for the Norwegian reader who continues to overestimate. Most variability is seen in the annotations of the broken otoliths which is the preferred method. It should be noted that the image quality of the sectioned otoliths is much higher. The AEM's show that there is a difference of just one year when comparing the readers estimates to modal age. (ICES WGBIOP, 2018).

2. Data needs

There are no major data deficiencies identified for this stock, whose assessment is usually of high quality.

The consumption amount of Norway pout by its main predators should be evaluated in relation to production amount in the Norway pout stock under consideration of consumption and production of other prey species for those predators in the ecosystem. This also implies need for information on prey switching dynamics of North Sea fish predators which also are foraging on Norway pout. Biological interactions with respect to intraspecific and interspecific relationships for Norway pout stock dynamics and important predator stock dynamics have been reviewed and further analysed in Nielsen (2017; Section 6) and there is referred to the general conclusions here.

Trends in bycatch levels in the samples from monitoring of the Danish and Norwegian commercial Norway pout fishery should also be analysed in future benchmark assessments.

It will be relevant to investigate retrospective patterns in the SESAM assessment among other in relation to the Mohn´s Rho values for recruitment, SSB and F, as well as to conduct further analyses of the uncertainty and residuals in the assessment. The catch residuals are higher than the survey residuals in the assessment but show no trends in the recent period from 2000 onwards. This should be explored further in future benchmarks.

12.11 References

Bigné, M.*, Nielsen, J.R.*,1, and Bastardie, F. 2019. Opening of the Norway pout box: will it change the ecological impacts of the North Sea Norway pout fishery? ICES J. Mar. Sci. 76 (1): 136–152, http://dx.doi.org/10.1093/icesjms/fsy121 (*Authorship equal. 1Corresponding author).

Brooks, M and Nielsen, J. R. 2020. Impact of revised IBTS survey indices on the Norway pout assessment output and sustainability reference points (Blim and Fcap) (Ad hoc). ICES Scientific Reports. 2:91. 51 pp. http://doi.org/10.17895/ices.pub.7504

Cormon, Xochitl, Bruno Ernande, Alexander Kempf, Youen Vermard, and Paul Marchal. 2016. North Sea saithe Pollachius virens growth in relation to food availability, density-dependence and temperature. Mar. Ecol. Prog. Ser. 542: 141–151.

Degel, H., Nedreaas, K., and Nielsen, J.R. 2006. Summary of the results from the Danish-Norwegian fishing trials autumn 2005 exploring bycatch-levels in the small-meshed industrial trawl fishery in the North Sea targeting Norway pout. Working Document No. 22 to the 2006 meeting of the WGNSSK, 13 pp. ICES C.M.2006/ACFM:35

Eigaard, O. R., and Holst, R. 2004. The effective selectivity of a composite gear for industrial fishing: a grid in combination with a square mesh window. Fisheries Research, 68: 99–112.

Eigaard, O., and Nielsen, J. R. 2009. Reduction of bycatch in a small-meshed trawl fishery through gear developments facilitating ecosystem-based fisheries management. ICES CM 2009/M:22. 18 pp.

Eigaard, O., Hermann, B., and Nielsen, J.R. 2012. Influence of grid orientation and time of day in a small-meshed trawl fishery for Norway pout (Trisopterus esmarkii). Aquat. Liv. Res. 25: 15–26. doi 10.1051/alr/2011152

Eigaard OR, Herrmann B, Feekings JP, Krag LA, Sparrevohn CR. 2021. A netting-based alternative to rigid sorting grids in the small-meshed Norway pout (Trisopterus esmarkii) trawl fishery. PLoS ONE 16(1): e0246076. https://doi. org/10.1371/journal.pone.0246076

Huse, G., Salthaug, A., and Skogen, M. D. 2008. Indications of a negative impact of herring on recruitment of Norway pout. – ICES Journal of Marine Science, 65: 906–911.

ICES SGMSNS 2006. Report of the study group on multispecies assessment in the North Sea. ICES CM 2006/RMC:02.

ICES WGSAM 2011. Report on the Working Group on Multispecies Assessment Methods. ICES WGSAM Report 2011. ICES CM 2011/SSGSUE:10.

ICES 2012a. Joint EU–Norway request on management measures for Norway pout. In Report of the ICES Advisory Committee, 2012. ICES Advice 2012, Book 6, Section 6.3.3.3, pp. 19–25.

ICES 2012b. Report of the Inter Benchmark Protocol on Norway Pout in the North Sea and Skagerrak (IBP Pout 2012), March–April 2012, By correspondence. ICES CM 2012/ACOM:43. 157 pp.

ICES WGSAM 2014. Interim Report of the Working Group on Multispecies Assessment Methods (WGSAM), 20–24 October 2014, London, UK. ICES CM 2014/SSGSUE:11. 104 pp.

ICES 2018. EU/Norway request to ICES on evaluation of long-term management strategies for Norway pout in ICES Subarea 4 (North Sea) and Division 3.a (Skagerrak–Kattegat). ICES Advice: Special Requests. Report. https://doi.org/10.17895/ices.pub.4374

ICES WKPOUT 2017. Report of the Benchmark Workshop on Norway Pout (Trisopterus esmarkii) in Sub-area 4 and Division 3a (North Sea, Skagerrak, and Kattegat), 23–25 August 2016, Copenhagen, Den-mark. ICES Document CM 2016/ACOM: 35. 69 pp.

ICES WKNPOUT 2018. Report of the Workshop for Management Strategy Evaluation for Norway Pout, ICES, Copenhagen 26–28 February 2018, ICES CM2018/ACOM:38 Ref WGNSSK, 96 pp

ICES WGBIOP 2018. First official SmartDots exchange (ICES WGBIOP) "Norway Pout Exchange 2018 Re-port" and "Norway Pout Exchange 2018 Summary Report" ICES SmartDots page, http://smartdots.ices.dk.

Johnsen, E. and Søvik, G. 2017. Estimation of abundance of Norway pout from shrimp surveys using the new open source software StoX. Working Document 5, ICES WKPOUT 2017. ICES CM 2016 / xx WKPOUT. 8 pp.

Johnsen, E., Misund, R., Palmason, S.R., and Blom, G. 2017. Norwegian industrial fishery for Norway pout in the North Sea. Working Document 3, ICES WKPOUT 2017. ICES CM 2016 / ACOM:35, 25 pp.

Kempf, Alexander, Jens Floeter, and Axel Temming. 2009. Recruitment of North Sea cod (Gadus morhua) and Norway pout (Trisopterus esmarkii) between 1992 and 2006: the interplay between climate influence and predation. Can. J. Fish. Aquat. Sci. 66: 633–648

Lambert, G. *, Nielsen, J. R. *1, Larsen, L., and Sparholt, H. 2009. Maturity and growth population dynamics of Norway pout (Trisopterus esmarkii) in the North Sea, Skagerrak and Kattegat. ICES Journal of Marine Science, 66(9): 1899–1914; *Authorship equal; 1Corresponding author. doi:10.1093/icesjms/fsp153.

Larsen, L.I., Lassen, H., Nielsen, J.R., and Sparholt, H. 2001. Working Document to the 2000 meeting of the WGNSSK. ICES C.M.2001/ACFM:07).

Nash, R. D. M., Wright, P. J., Matejusova, I., Dimitrov, S. P., O'Sullivan, M., Augley, J., and Höffle, H. 2012. Spawning location of Norway pout (Trisopterus esmarkii Nilsson) in the North Sea. – ICES Journal of Marine Science, 69: 1338–1346.

Nielsen, J.R. 2017. Norway pout population dynamics and ecological role in the North Sea and Skagerrak. Working Document 1, ICES WKPOUT 2017. ICES CM 2016 / ACOM:35, 99 pp.

Nielsen, J. R., and Madsen, N. 2006. Gear technological approaches to reduce unwanted bycatch in commercial Norway Pout Fishery in the North Sea. Working Document No. 23, ICES WGNSSK (2006). ICES CM 2007/ACFM:35. 10 pp.

Nielsen, J.R.*1, Lambert, G.*, Bastardie, F., Sparholt, H., and M. Vinther. 2012. Do Norway pout (Trisopterus esmarkii) die from spawning stress? Mortality of Norway pout in relation to growth, maturity and density in the North Sea, Skagerrak and Kattegat. ICES J. Mar. Sci. 69(2): 197–207. *Authorship equal; 1Corresponding author. Doi:10.1093/icesjms/fss001.

Nielsen, J.R., Olsen, J., Håkonsson, K.B., Egekvist, J., and Dalskov, J. 2017. Danish Norway pout fishery in the North Sea and Skagerrak. Working Document 2, ICES WKPOUT 2017. ICES CM 2016 / ACOM:35, 81 pp.

Otterå, H., Wathne, J. A., Fuglebakk, E., Slotte, A., Svendsen, B. V., and Vølstad, J. H. 2023. A novel probabilistic survey method for at sea sampling in pelagic fisheries – the Norwegian catch sampling lottery. Fisheries Research, 260: 106584.

Paoletti, S.*, Nielsen, J.R.*, Sparrevohn, C.R., Bastardie, F., and Vastenhoud, B. 2021. Potential for mesopelagic fishery compared to economy and fisheries dynamics in current large-scale Danish pelagic fishery? (Front. Mar. Sci. 8: https://doi.org/10.3389/fmars.2021.720897 (*Authorship equal)).

Raitt, D.F.S. 1968. The population dynamics of Norway Pout in the North Sea. Marine Research 5 : 1–23.

Rindorf, A., Andersen, N. G., and Vinther, M. 2010. Spatial differences in natural mortality of North Sea gadoids. ICES Document CM2010/C: 18.

Silva, J.F. 2015. Norway pout (Trisopterus esmarkii) in the English Q3 IBTS survey. Working Document to the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (ICES WGNSSK), September 2015.

Sparholt, H., Larsen, L. I., and Nielsen, J. R. 2002a. Verification of multispecies interactions in the North Sea by trawl survey data on Norway pout (Trisopterus esmarkii). ICES Journal of Marine Science, 59: 1270–1275.

Sparholt, H., Larsen, L. I., and Nielsen, J. R. 2002b. Non-predation natural mortality of Norway pout (Trisopterus esmarkii) in the North Sea. ICES Journal of Marine Science, 59: 1276–1284.

Vinther, M. and Nielsen, J.R. 2012. Evaluations of management strategies for Norway pout in the North Sea and Skagerrak Report (NOP-MSE). ICES NOP-MSE Report 2012. ICES CM 2012/ACOM:69.

Vinther, M. and Nielsen, J.R. 2013. Evaluations of management strategies for Norway pout in the North Sea and Skagerrak. Working document to ICES WGNSSK, May 2013. ICES CM2013/ACOM.

12.12 Tables

Table 12.2.1. Norway pout in Subarea 4 and Division 3.a. Nominal landings (tonnes) from the North Sea and Skagerrak / Kattegat, ICES Subarea 27.4 and Division 27.3.a in the period 2004–2023, as officially reported to ICES. Bycatch of Norway pout in other (small-meshed) fishery included.

Subarea 4 and Division 3.a combined	Denmark	Faroe Islands	France	Norway	Sweden	Netherlands	Germany	UK	Lithuania	Total nominal landings	Unallocated catches***	ICES estimate of total landings (Subarea 4 + Division 3.a)
2004	11345	1159	0	4994	88	0	107	0	0	17693	−4193	13500
2005	941**	24	0	962	0	0	0	0	0	1927	-24	1903
2006	39943	0	0	13622	0	0	34	0	0	53599	−6973	46626
2007	83	0	<1	4712	0	0	0	0	0	4795	997	5792
2008	32558	0	<1	6650	10	0	0	0	0	39218	−3080	36138
2009	19820	0	0	37252	0	22	75	0	0	57170	−2645	54525
2010	71312	0	0	65634	10	18	0	29	0	137003	−11048	125955
2011	4072	0	0	3210	1	0	0	0	0	7282	−758	6524
2012	25558	0	0	4587	3	0	0	6	0	30154	−3081	27073
2013	38364	0	0	46601	4	0	0	0	0	84969	−2869	82100
2014	28448	0	0	18664	2	0	0	14	0	47128	−2958	44170
2015	13033	5270	0	44360	727	18	22	3	0	63434	−34	63400

Subarea 4 and Division 3.a combined	Denmark	Faroe Islands	France	Norway	Sweden	Netherlands	Germany	UK	Lithuania	Total nominal landings	Unallocated catches***	ICES estimate of total landings (Subarea 4 + Division 3.a)
2016	23507	3156	0	36052	2	8	27	30	0	62782	618	63400
2017	12467	0	0	21357	6	1	17	0	0	33848	85	33933
2018	10546	0	0	25504	5	2	3	<1	0	36060	87	36147
2019	37850	3034	0	59662	53	16	0	0	0	100615	−2961	97654
2020	65720	1554	<1	63777	48	88	4	86	23	131300	−1803	129497
2021	42002	0	8	29952	6	23	486	10	0	72486	-532	71954
2022	21212	0	61	14515	99	60	6	1	0	35954	-230	35724
2023*	2840	0	2	24513	20	3	0	0	0	27378	-22	27356

*** Nominal landings are preliminary**

**** 781 tonnes from trial fishery (directed fishery); 160 tonnes from bycatches in other fisheries.**

***** Difference between total nominal landings and ICES estimates of total landings including bycatch of other species.**

Division 3.a	Denmark	Faroe Islands	Norway	Sweden	Germany	Total
2004	110	45	41	-	54	250
2005	-	-	-	-	-	0
2006	18	-	2	-	-	20
2007	24	-	-	-	-	24

Division 3.a	Denmark	Faroe Islands	Norway	Sweden	Germany	Total
2008	156	-	-	-	-	156
2009	-	-	209	-	-	209
2010	51	-	711	10	-	772
2011	2	-	-	-	-	2
2012	118	-	-	-	-	118
2013	6945	-	147	1	-	7093
2014	538	-	9	1	-	548
2015	2220	-	41	1	-	2262
2016	918	-	82	1	-	1001
2017	110	-	72	4	2	188
2018	159	-	6	1	-	166
2019	1125	-	6	18	-	1149
2020	5585	-	16	13	-	5614
2021	1942	-	1	2	-	1945
2022	802	-	1	3	-	806
2023*	886	-	<1	2	-	888

*** Preliminary**

Division 4.a	Denmark	Faroe Islands	France	Netherlands	Germany	Norway	Sweden	UK	Lithuania	Total
2004	10762	1085	-	-	27	4953	-	-	-	16827
2005	941**	24	-	-	-	962	-	-	-	1927
2006	39531	-	-	-	15	13618	-	-	-	53164
2007	59	-	-	-	-	4712	-	-	-	4771
2008	32158	-	-	-	-	6650	10	-	-	38818
2009	19226	-	-	22	-	36961	-	-	-	56209
2010	71032	-	-	18	-	64303	< 1	29	-	135382
2011	4038	-	-	-	-	3189	1	-	-	7227
2012	25431	-	-	-	-	4528	3	6	-	29968
2013	31375	-	-	-	-	45839	4	-	-	77218
2014	27894	-	-	-	-	18647	1	8	-	46550
2015	10760	5270	-	17	22	43742	12	3	-	59827
2016	21125	3156	-	8	27	35959	<1	12	-	60286
2017	12312	-	-	1	1	21275	<1	-	-	33589
2018	10367	-	-	2	-	25498	4	-	-	35871
2019	36152	3034	-	15	-	59546	32	-	-	98780
2020	59515	1554	<1	88	4	63726	35	82	23	125027

Division 4.a	Denmark	Faroe Islands	France	Netherlands	Germany	Norway	Sweden	UK	Lithuania	Total
2021	39871	-	8	23	486	29863	2	10	-	70263
2022	20365	2	61	59	6	14380	46	1	-	34920
2023*	1923	-	2	3	-	24507	7	<1	-	26442

*** Preliminary**

**** 781 tonnes from trial fishery (directed fishery); 160 tonnes from bycatches in other fisheries.**

Division 4.b	Denmark	Faroe Islands	France	Germany	Netherlands	Norway	Sweden	UK	Total
2004	473	29	-	26	-	-	88	-	616
2005	-	-	-	-	-	-	-	-	0
2006	394	-	-	19	-	2	-	-	415
2007	-	-	-	-	-	-	-	-	0
2008	244	-	-	-	-	-	-	-	244
2009	595	-	-	75	-	82	-	-	752
2010	229	-	-	-	-	620	-	-	849
2011	32	-	-	-	-	21	-	-	53
2012	9	-	-	-	-	59	-	-	68
2013	43	-	-	-	-	615	<1	-	658
2014	16	-	-	-	-	8	-	6	30

Division 4.b	Denmark	Faroe Islands	France	Germany	Netherlands	Norway	Sweden	UK	Total
2015	53	-	-	-	1	577	714	-	1345
2016	1463	-	-	-	<1	11	1	18	1493
2017	45	-	-	13	<1	10	2	-	71
2018	20	-	-	3	<1	-	-	-	23
2019	573	-	-	-	1	109	3	-	686
2020	620	-	-	-	<1	35	-	3	659
2021	189	-	-	-	-	88	2	-	278
2022	45	-	<1	-	-	133	51	-	229
2023*	30	-	-	-	-	6	12	-	48

*** Preliminary**

Division 4.c	Denmark	France	UK	Total
2004	-	-	-	0
2005	-	-	-	0
2006	-	-	-	0
2007	-	< 1	-	<1
2008	-	< 1	-	<1
2009	-	-	-	0

Division 4.c	Denmark	France	UK	Total
2010	-	-	-	0
2011	-	-	-	0
2012	-	-	-	0
2013	-	-	-	0
2014	-	-	-	0
2015	-	-	-	0
2016	1	-	-	1
2017	-	-	-	0
2018	-	-	<1	<1
2019	-	-	-	0
2020	-	-	-	0
2021	-	-	-	0
2022	-	-	-	0
2023*	-	-	-	0

*** Preliminary**

Table 12.2.2. Norway pout in Subarea 4 and Division 3.a. Annual landings ('000 t) in the North Sea and Skagerrak (not incl. Kattegat, 3.aS) by country, for 1961–2023 (Data provided by ICES WGNSSK Working Group members). Norwegian landing data include landings of bycatch of other species.

Year	Denmark		Faroes	Norway	Sweden	UK (Scotland)	Others	Total
	North Sea	Skagerrak						
1961	20,5	-	-	8,1	-	-	-	28,6
1962	121,8	-	-	27,9	-	-	-	149,7
1963	67,4	-	-	70,4	-	-	-	137,8
1964	10,4	-	-	51	-	-	-	61,4
1965	8,2	-	-	35	-	-	-	43,2
1966	35,2	-	-	17,8	-	-	+	53,0
1967	169,6	-	-	12,9	-	-	+	182,5
1968	410,8	-	-	40,9	-	-	+	451,7
1969	52,5	-	19,6	41,4	-	-	+	113,5
1970	142,1	-	32	63,5	-	0,2	0,2	238,0
1971	178,5	-	47,2	79,3	-	0,1	0,2	305,3
1972	259,6	-	56,8	120,5	6,8	0,9	0,2	444,8
1973	215,2	-	51,2	63	2,9	13	0,6	345,9
1974	464,5	-	85,0	154,2	2,1	26,7	3,3	735,8
1975	251,2	-	63,6	218,9	2,3	22,7	1	559,7
1976	244,9	-	64,6	108,9	+	17,3	1,7	437,4
1977	232,2	-	48,8	98,3	2,9	4,6	1	387,8
1978	163,4	-	18,5	80,8	0,7	5,5	-	268,9
1979	219,9	9	21,9	75,4	-	3	-	329,2
1980	366,2	11,6	34,1	70,2	-	0,6	-	482,7
1981	167,5	2,8	16,4	51,6	-	+	-	238,3
1982	256,3	35,6	12,3	88	-	-	-	392,2
1983	301,1	28,5	30,7	97,3	-	+	-	457,6
1984	251,9	38,1	19,11	83,8	-	0,1	-	393,01
1985	163,7	8,6	9,9	22,8	-	0,1	-	205,1
1986	146,3	4	2,5	21,5	-	-	-	174,3
1987	108,3	2,1	4,8	34,1	-	-	-	149,3
1988	79	7,9	1,3	21,1	-	-	-	109,3
1989	95,7	4,2	0,8	65,3	+	0,1	0,3	166,4
1990	61,5	23,8	0,9	77,1	+	-	-	163,3
1991	85	32	1,3	68,3	+	-	+	186,6
1992	146,9	41,7	2,6	105,5	+	-	0,1	296,8
1993	97,3	6,7	2,4	76,7	-	-	+	183,1
1994	97,9	6,3	3,6	74,2	-	-	+	182
1995	138,1	46,4	8,9	43,1	0,1	+	0,2	236,8
1996	74,3	33,8	7,6	47,8	0,2	0,1	+	163,8
1997	94,2	29,3	7,0	39,1	+	+	0,1	169,7
1998	39,8	13,2	4,7	22,1	-	-	+	79,8
1999	41	6,8	2,5	44,2	+	-	-	94,5
2000	127	9,3	-	48	0,1	-	+	184,4
2001	40,6	7,5	-	16,8	0,7	+	+	65,6
2002	50,2	2,8	3,4	23,6	-	-	-	80,0
2003	9,9	3,4	2,4	11,4	-	-	-	27,1
2004	8,1	0,3	-	5	-	-	0,1	13,5
2005	0.9*	-	-	1	-	-	-	1,9
2006	35,1	0,1	-	11,4	-	-	-	46,6
2007	2.0**	-	-	3,7	-	-	-	5,7
2008	30,4	-	-	5,7	+	-	+	36,1
2009	17,5	-	-	37,0	+	-	+	54,5
2010	64,9	0,2	-	60,9	+	+	+	126,0
2011	3,3	-	-	3,2	+	+	+	6,5
2012	22,3	0,1	-	4,6	+	+	+	27,0
2013	29,0	6,2	-	46,9	+	+	+	82,1
2014	25,0	0,5	-	18,7	+	+	+	44,2
2015	10,8	2,2	5,3	44,4	0,7	+	+	63,4
2016	23,2	0,9	3,2	36,1	+	+	+	63,4
2017	12,4	0,1	+	21,4	+	+	+	33,9
2018	10,5	0,2	+	25,5	+	+	+	36,2
2019	36,8	1,1	+	59,8	+	+	+	97,7
2020	60,1	5,6	+	63,8	+	+	+	129,5
2021	40,1	1,9	+	30,0	+	+	+	72,0
2022	20,4	0,8	+	14,5	+	+	+	35,7
2023	2,0	0,9	+	24,5	+	+	+	27,4

* 781 t taken in a trial fishery; 160 t in by-catches in other (small meshed) fisheries.
** 681 t taken in trial fishery; 1300 t in by-catches in other (small meshed) fisheries.
"+" indicate catches below 50 t

Table 12.2.3. Norway pout in Subarea 4 and Division 3.a. National landings (tonnes) by quarter of year 2006–2024 and by area and country. Data provided by Working Group members. Norwegian landing data include landings of bycatch of other species. Bycatch of Norway pout in other (small-meshed) fisheries included.

Year	Quarter	Denmark									Norway		Total
	Area	IIIaN	IIIaS	Div. IIIa	IVaE	IVaW	IVb	IVc	Div. IV	Div. IV + IIIaN	IVaE	Div. IV	Div. IV + IIIaN
2007	1	-	-	-	561	789	-	-	1.350	1.350	74	74	1.424
	2	-	-	-	4	-	-	-	4	4	1.097	1097	1.101
	3	1	2	3	-	-	-	-	-	1	2.429	2429	2.430
	4	-	-	-	-	682	-	-	682	682	155	155	837
	Total	1	2	3	565	1.471	-	-	2.036	2.037		3.755	5.792
2008	1	125	-	125	19	86	123	-	228	353	7	7	360
	2	-	-	-	-	-	30	-	30	30	1.803	1803	1.833
	3	-	-	-	-	6.102	-	-	6.102	6.102	3.582	3582	9.684
	4	-	-	-	-	22.686	1.239	-	23.925	23.925	336	336	24.261
	Total	125	-	125	19	28.874	1.392	-	30.285	30.410		5.728	36.138
2009	1	1	-	1	22	515	-	-	537	538	2	2	540
	2	-	-	-	-	-	-	-	-	-	4.026	4026	4.026
	3	2	-	2	-	11.567	-	-	11.567	11.569	31.251	31251	42.820
	4	-	-	-	-	5.399	4	-	5.403	5.403	1.736	1736	7.139
	Total	3	-	3	22	17.481	4	-	17.507	17.510	37.015	37.015	54.525
2010	1	-	-	-	-	194	-	-	194	194	104	104	298
	2	157	-	157	-	478	59	-	537	694	17.906	17906	18.600
	3	37	-	37	-	33.618	213	-	33.831	33.868	41.883	41883	75.751
	4	8	-	8	-	30.276	38	-	30.314	30.322	984	984	31.306
	Total	202	-	202	-	64.566	310	-	64.876	65.078	60.877	60.877	125.955
2011	1	-	-	-	-	-	-	-	-	-	-	0	-
	2	-	-	-	-	-	-	-	-	-	188	188	188
	3	-	-	-	-	456	5	-	461	461	3.004	3004	3.465
	4	-	-	-	-	2.853	-	-	2.853	2.853	18	18	2.871
	Total	-	-	-	-	3.309	5	-	3.314	3.314	3.210	3.210	6.524
2012	1	-	-	-	-	15	-	-	15	15	12	12	27
	2	-	-	-	-	-	-	-	-	-	280	280	280
	3	2	-	2	-	62	8	-	70	72	395	395	467
	4	125	-	125	-	22.204	-	-	22.204	22.329	3.900	3.900	26.229
	Total	127	-	127	-	22.281	8	-	22.289	22.416	4.587	4.587	27.003
2013	1	-	-	-	-	59	-	-	59	59	18	18	77
	2	6	-	6	-	409	-	-	409	415	10.045	10.045	10.460
	3	4.791	-	4.791	5	3.260	43	-	3.308	8.099	16.350	16.350	24.449
	4	1.366	-	1.366	-	25.211	-	-	25.211	26.577	20.537	20.537	47.114
	Total	6.163	-	6.163	5	28.939	43	-	28.987	35.150	46.950	46.950	82.100
2014	1	-	-	-	-	1.318	-	-	1.318	1.318	6	6	1.324
	2	62	-	62	-	-	2	-	2	64	3.146	3.146	3.210
	3	492	-	492	-	5.606	20	-	5.626	6.118	7.252	7.252	13.370
	4	-	-	-	-	18.006	-	-	18.006	18.006	8.260	8.260	26.266
	Total	554	-	554	-	24.930	22	-	24.952	25.506	18.664	18.664	44.170
2015	1	-	-	-	21	305	-	-	326	326	268	268	594
	2	2	-	2	-	549	-	-	549	551	6.812	6.812	7.363
	3	2.217	1	2.218	10	3.221	19	-	3.250	5.467	21.335	21.335	26.802
	4	-	-	-	-	6.689	-	-	6.689	6.689	15.945	15.945	22.634
	Total	2.219	1	2.220	31	10.764	19	-	10.814	13.033	44.360	44.360	57.393
2016	1	-	-	-	-	514	-	-	514	514	575	575	1.089
	2	244	1	245	-	267	-	-	267	511	8.296	8.296	8.807
	3	673	1	674	5	2.222	51	-	2.278	2.951	20.897	20.897	23.848
	4	-	-	-	3	20.135	-	-	20.138	20.138	6.286	6.286	26.424
	Total	917	2	919	8	23.138	51	-	23.197	24.114	36.054	36.054	60.168
2017	1	-	-	-	-	703	-	-	703	703	30	30	733
	2	5	-	5	-	-	-	-	-	5	3.470	3.470	3.475
	3	104	-	104	6	1.969	-	-	1.975	2.079	11.546	11.546	13.625
	4	-	-	-	68	9.597	2	-	9.667	9.667	6.433	6.433	16.100
	Total	109	-	109	74	12.269	3	-	12.345	12.454	21.479	21.479	33.933
2018	1	-	-	-	-	371	-	-	371	371	9	9	380
	2	2	-	2	-	3	-	-	3	5	4.138	4.138	4.143
	3	157	-	157	-	190	1	-	191	348	8.969	8.969	9.317
	4	-	-	-	-	9.921	-	-	9.921	9.921	12.386	12.386	22.307
	Total	159	-	159	-	10.485	1	-	10.486	10.645	25.502	25.502	36.147
2019	1	-	-	-	-	483	-	-	483	483	13	13	496
	2	178	-	178	-	2.166	-	-	2.166	2.344	8.832	8.832	11.176
	3	947	-	947	-	5.347	1	-	5.348	6.295	32.326	32.326	38.621
	4	-	-	-	-	28.208	567	-	28.775	28.775	18.586	18.586	47.361
	Total	1.125	-	1.125	-	36.204	568	-	36.772	37.897	59.757	59.757	97.654
2020	1	-	-	-	111	3.432	-	-	3.543	3.543	282	282	3.825
	2	2.343	-	2.343	-	1.288	-	-	1.288	3.631	7.333	7.333	10.964
	3	3.018	-	3.018	-	3.574	2	-	3.576	6.594	40.868	40.868	47.462
	4	225	-	225	129	51.570	33	-	51.732	51.957	15.289	15.289	67.246
	Total	5.586	-	5.586	240	59.864	35	-	60.139	65.725	63.772	63.772	129.497
2021	1	-	-	-	-	6.650	-	-	6.650	6.650	64	64	6.714
	2	1.036	-	1.036	-	606	-	-	606	1.642	12.787	12.787	14.429
	3	864	-	864	-	3.376	1	-	3.377	4.241	15.825	15.825	20.066
	4	42	-	42	44	29.382	1	-	29.427	29.469	1.276	1.276	30.745
	Total	1.942	-	1.942	44	40.014	2	-	40.060	42.002	29.952	29.952	71.954
2022	1	-	-	-	-	605	-	-	605	605	0	0	605
	2	218	-	218	-	-	-	-	-	218	3.431	3.431	3.649
	3	584	-	584	-	104	37	-	141	725	8.304	8.304	9.029
	4	-	-	-	-	19.656	8	-	19.664	19.664	2.779	2.779	22.443
	Total	802	-	802	-	20.365	45	-	20.410	21.212	14.514	14.514	35.726
2023	1	-	-	-	-	721	-	-	721	721	15	15	736
	2	299	-	299	-	-	-	-	-	299	6.694	6.694	6.993
	3	582	-	582	-	110	29	-	139	721	14.325	14.325	15.046
	4	-	-	-	-	1.091	-	-	1.091	1.091	3.478	3.478	4.569
	Total	881	-	881	-	1.922	29	-	1.951	2.832	24.512	24.512	27.344
2024	1	-	-	-	-	-	-	-	-	-	-	0	-
	2	-	-	-	-	-	-	-	-	-	173	173	173
	3	11	-	11	-	12	-	-	12	23	2.101	2.101	2.124

Table 12.2.3a. Norway pout in Subarea 4 and Division 3.a. Observed and SESAM model predicted total catches in tonnes by quarter.

Year	Observed	Predicted
1984.00	56790	65552
1984.25	56532	35772
1984.50	152291	114757
1984.75	110942	94053
1985.00	57467	48351
1985.25	15509	16071
1985.50	62489	66096
1985.75	92017	60822
1986.00	37773	26301
1986.25	7657	9075
1986.50	45085	36796
1986.75	89993	39493
1987.00	33883	29008
1987.25	15435	8353
1987.50	38729	35806
1987.75	60847	66507
1988.00	22181	22829
1988.25	3559	5948
1988.50	21793	17659
1988.75	61762	32072
1989.00	15379	12478
1989.25	13234	11406
1989.50	55066	38673
1989.75	82880	47923
1990.00	27984	25640
1990.25	39713	22085
1990.50	26156	29800
1990.75	45242	46021

Year	Observed	Predicted
1991.00	42722	31435
1991.25	20786	21073
1991.50	62518	56702
1991.75	64380	60158
1992.00	64218	52093
1992.25	27973	27920
1992.50	114122	88554
1992.75	96177	85370
1993.00	36214	48883
1993.25	29291	27480
1993.50	62290	60478
1993.75	53470	48212
1994.00	34575	26708
1994.25	15373	14722
1994.50	53799	44025
1994.75	79838	39726
1995.00	36942	27390
1995.25	28019	20473
1995.50	69763	64595
1995.75	97048	60317
1996.00	21888	26310
1996.25	13366	15045
1996.50	74631	64821
1996.75	46194	39403
1997.00	15320	16193
1997.25	8708	9639
1997.50	78809	63848
1997.75	54100	51949
1998.00	19502	19169

Year	Observed	Predicted
1998.25	11836	12162
1998.50	20866	30408
1998.75	22830	24952
1999.00	7827	7158
1999.25	12533	7823
1999.50	41445	26046
1999.75	30497	32368
2000.00	10207	11469
2000.25	11589	13466
2000.50	44173	42933
2000.75	119001	69252
2001.00	21400	16092
2001.25	11778	9168
2001.50	4630	14314
2001.75	26565	31618
2002.00	8553	6760
2002.25	6686	4322
2002.50	32922	18229
2002.75	28947	22976
2003.00	3190	3266
2003.25	3106	1954
2003.50	10833	11132
2003.75	7518	7311
2004.00	2040	1688
2004.25	667	635
2004.50	4018	5239
2004.75	6762	7276
2005.00	8	5
2005.25	8	5

Year	Observed	Predicted
2005.50	13	10
2005.75	13	12
2006.00	2205	1845
2006.25	2848	2547
2006.50	6551	8559
2006.75	34949	25742
2007.00	1428	615
2007.25	1100	1142
2007.50	2430	3704
2007.75	838	1904
2008.00	361	304
2008.25	1840	1568
2008.50	8532	5450
2008.75	24111	4616
2009.00	538	210
2009.25	2105	3008
2009.50	36661	19857
2009.75	6509	8712
2010.00	198	273
2010.25	40322	7414
2010.50	57487	27119
2010.75	33071	16985
2011.00	0	0
2011.25	222	1242
2011.50	3749	5734
2011.75	2872	5972
2012.00	29	46
2012.25	281	588
2012.50	469	1559

Year	Observed	Predicted
2012.75	26168	13740
2013.00	79	111
2013.25	10460	3033
2013.50	24444	13485
2013.75	47126	43343
2014.00	1324	447
2014.25	3212	3846
2014.50	13384	14426
2014.75	26244	19704
2015.00	594	493
2015.25	7364	6326
2015.50	26804	27360
2015.75	22655	28508
2016.00	1089	710
2016.25	8846	6588
2016.50	23849	24163
2016.75	26457	22543
2017.00	735	437
2017.25	3475	5021
2017.50	13623	18890
2017.75	16107	23124
2018.00	379	246
2018.25	4143	4751
2018.50	9316	12500
2018.75	22292	14824
2019.00	495	397
2019.25	11179	7807
2019.50	38621	24934
2019.75	47373	32047

Year	Observed	Predicted
2020.00	3808	1500
2020.25	10958	13282
2020.50	47467	39111
2020.75	67100	54854
2021.00	6724	2383
2021.25	14428	11016
2021.50	20060	22444
2021.75	30767	34518
2022.00	604	404
2022.25	3647	3649
2022.50	9031	10184
2022.75	22444	17136
2023.00	736	289
2023.25	6996	1971
2023.50	15048	8643
2023.75	4576	6891
2024.00	0	0
2024.25	173	318
2024.50	2124	3597

Table 12.2.4. Norway pout in Subarea 4 and Division 3.a. Catch in numbers-at-age by quarter (millions). SOP is given in tonnes. Data for 1990 were estimated within the SXSA program used in the 1996 assessment.

Age	Year	1984				1985				1986			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	1	2231	0	0	6	678	0	0	0	5572
1		2.759	2252	5290	3492	2.264	857	1400	2991	396	260	1186	1791
2		1.375	1165	1683	734	1.364	145	793	174	1069	87	245	39
3		143	269	8	0	192	13	19	0	72	3	6	0
4+		0	0	0	0	1	0	0	0	3	0	0	0
SOP		56790	56532	152291	110942	57464	15509	62489	92017	37889	7657	45085	89993
Age	Year	1987				1988				1989			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	8	227	0	0	741	3146	0	0	159	4854
1		2687	1075	1627	2151	249	95	183	632	1736	678	1672	1741
2		401	60	171	233	700	74	250	405	48	133	266	93
3		12	0	0	5	20	0	0	0	6	6	5	13
4+		1	0	0	0	0	0	0	0	0	0	0	0
SOP		33894	15435	38729	60847	22181	3559	21793	61762	15379	13234	55066	82880
Age	Year	1990				1991				1992			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	20	993	0	0	734	3486	0	0	879	954
1		1840	1780	971	1181	1501	636	1519	1048	3556	1522	3457	2784
2		584	572	185	116	1336	404	215	187	1086	293	389	267
3		20	19	6	4	93	19	22	18	118	20	1	2
4+		10	0	0	0	6	0	0	0	3	0	0	0
SOP		28287	39713	26156	45242	42776	20786	62518	64380	64224	27973	114122	96177
Age	Year	1993				1994				1995			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	96	1175	0	0	647	4238	0	0	700	1692
1		1942	813	1147	1050	1975	372	1029	1148	3992	1905	2545	3348
2		699	473	912	445	591	285	421	134	240	256	47	59
3		15	58	19	2	56	29	71	0	6	32	3	3
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		36206	29291	62290	53470	34575	15373	53799	79838	36942	28019	69763	97048
Age	Year	1996				1997				1998			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	724	2517	0	0	109	343	0	0	94	339
1		535	560	1043	650	672	99	3090	1922	261	210	411	531
2		772	201	1002	333	325	131	372	207	690	310	332	215
3		14	38	37	0	79	119	105	35	47	18	2	13
4+		0	0	0	0	0	0	0	0	8	24	0	0
SOP		21888	13366	74631	46194	15320	8708	78809	54100	19562	12026	20866	22830
Age	Year	1999				2000				2001			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	41	1127	0	0	73	302	0	0	32	368
1		202	318	1298	576	653	280	1368	4616	220	133	122	267
2		128	220	338	160	185	207	266	245	845	246	27	439
3		73	93	35	23	3	48	20	6	35	100	1	1
4+		1	0	0	0	0	0	0	0	0	0	0	0
SOP		7833	12535	41445	30497	10207	11589	44173	119001	21400	11778	4630	26565
Age	Year	2002				2003				2004			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	340	290	0	0	7	1	0	0	14	57
1		485	351	621	473	59	64	191	54	13	4	51	100
2		148	24	284	347	76	49	121	161	55	16	51	78
3		17	5	24	26	22	25	16	32	9	6	7	2
4+		0	0	0	0	0	0	0	1	0	0	0	0
SOP		8553	6686	32922	28947	3190	3106	10842	7549	2040	667	4018	6762
Age	Year	2005				2006				2007			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		*	*	*	*			10	368	0	0	0	0
1		*	*	*	*	30	56	130	1086	20	41	32	10
2		*	*	*	*	52	45	65	50	43	26	16	6
3		*	*	*	*	9	24	7	1	0	0	2	1
4+		*	*	*	*	0	0	0	0	0	0	0	0
SOP		8	8	13	13	2205	2848	6551	34949	1428	1100	2430	838
Age	Year	2008				2009				2010			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	0	1179	0	0	58	12	0	0	0	0
1		5	54	166	438	50	36	621	169	6	799	1118	716
2		10	41	115	31	1	47	613	27	1	905	738	331
3		0	0	0	0	0	5	9	1	0	17	15	0
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		361	1840	8532	24111	538	2105	36661	6509	198	40322	57487	33071
Age	Year	2011				2012				2013			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	0	1	0	0	1	135	0	0	8	76
1		0	1	44	23	1	5	8	404	5	631	805	1287
2		0	5	69	61	0	2	4	185	0	39	131	199
3		0	0	4	0	0	2	1	10	0	4	18	27
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		0	222	3749	2872	29	281	469	26168	79	10460	24444	47126
Age	Year	2014				2015				2016			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	141	884	0	0	14	33	0	0	13	480
1		10	33	197	522	46	365	1064	934	19	260	492	406
2		51	60	167	115	6	23	164	33	40	160	291	339
3		1	2	3	0	1	2	2	5	2	10	7	0
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		1324	3212	13384	26244	594	7364	26804	22655	1089	8846	23849	26457
Age	Year	2017				2018				2019			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	7	11	0	0	24	638	0	0	97	1007
1		39	159	319	515	1	114	111	261	47	519	1629	1767
2		1	25	127	87	21	84	140	385	10	284	97	64
3		0	4	40	7	1	8	17	0	4	29	4	0
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		735	3474	13623	16107	379	4143	9316	22291	495	11179	38627	47372
Age	Year	2020				2021				2022			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4
0		0	0	29	127			3	105			39	246
1		288	353	1774	2439	31	330	526	699	1	118	207	412
2		270	266	247	183	311	311	260	359	26	32	103	204
3		2	20	9	3	11	19	8	8	2	8	9	15
4+		0	0	0	0	0	0	0	0	0	0	0	0
SOP		3807	10959	47471	67211	6724	14426	20063	30764	604	3647	9030	22443
Age	Year	2023				2024							
	Quarter	1	2	3	4	1	2	3	4				
0		0	0	5	7	0	0	0					
1		2	379	646	199	0	0	26					
2		32	22	58	10	0	4	30					
3		2	1	4	1	0	1	4					
4+		0	0	0	0	0	0	0					
SOP		736	6994	15046	4575	0	173	2124					

In 2007-08: Catch numbers from Norwegian fishery calculated from Norwegian total catch weight divided by mean weight at age from Danish Fishery.

Table 12.2.5. Norway pout in Subarea 4 and Division 3.a. Mean weights (grammes) at age in catch, by quarter 1984–2024, from Danish and Norwegian catches combined. See footnote concerning data from 2005–2008 and 2010–2013. The mean weights at age weighted with catch number by area, quarter, and country (DK, N).

Year	1984				1985				1986			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			6,54	6,54			8,37	6,23				7,20
1	6,55	8,97	17,83	20,22	7,86	12,56	23,10	26,97	6,69	14,49	28,81	26,90
2	24,04	22,66	34,28	35,07	22,7	28,81	36,52	40,90	29,74	42,92	43,39	44,00
3	39,54	37,00	34,10	46,23	45,26	43,38	58,99		44,08	55,39	47,60	
4					41,80				82,51			
Year	1987				1988				1989			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			5,80	7,40			9,42	7,91			7,48	6,69
1	8,13	12,59	20,16	23,36	9,23	11,61	26,54	30,60	7,98	13,49	26,58	26,76
2	28,26	31,51	34,53	37,32	27,31	33,26	39,82	43,31	26,74	28,70	35,44	34,70
3	52,93			46,60	38,38				39,95	44,39		46,50
4	63,09				69,48							
Year	1990				1991				1992			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			6,40	6,67			6,06	6,64		8,00	6,70	8,14
1	6,51	13,75	20,29	28,70	7,85	12,95	30,95	30,65	8,78	11,71	26,52	27,49
2	25,47	25,30	32,92	38,90	20,54	28,75	44,28	43,10	25,73	31,25	42,42	44,14
3	37,72	40,35	39,40	52,94	35,43	49,87	67,25	59,37	41,80	49,49	50,00	50,30
4	68,00				44,30				43,90			
Year	1993				1994				1995			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			4,40	8,14			5,40	8,81			5,01	7,19
1	9,32	14,76	25,03	26,24	8,56	15,22	29,26	31,23	7,70	10,99	25,37	24,6
2	24,94	30,58	35,19	36,44	25,91	29,27	38,91	49,59	24,69	22,95	33,40	39,57
3	46,50	48,73	55,40	70,80	42,09	46,88	53,95		50,78	37,69	45,56	57,00
4												
Year	1996				1997				1998			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			3,88	5,95			3,61	10,18			4,82	8,32
1	8,95	12,06	27,81	28,09	7,01	11,69	20,14	22,11	8,76	12,55	23,82	24,33
2	21,47	25,72	40,90	38,81	23,11	26,40	31,13	32,69	22,16	25,27	31,73	30,93
3	37,58	37,94	50,44	56,00	39,11	34,47	44,03	38,62	34,84	32,18	44,92	33,24
4									42,40	40,00		
Year	1999				2000				2001			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			2,84	7,56			7,21	13,86			6,34	7,90
1	8,98	12,40	22,16	25,60	10,05	15,65	23,76	22,98	8,34	16,79	27,00	30,01
2	25,84	24,15	32,66	37,74	19,21	25,14	38,90	34,48	21,50	23,57	39,54	35,51
3	36,66	35,24	43,98	51,63	32,10	41,30	39,61	50,04	39,84	37,63	54,20	55,70
4	46,57	46,57										
Year	2002				2003				2004			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			7,28	7,20			9,12	9,79			9,80	7,89
1	8,59	16,40	27,13	27,47	11,58	13,13	28,33	15,98	11,54	14,63	31,02	31,75
2	25,98	30,39	43,37	36,87	22,85	26,19	38,01	31,87	27,41	26,22	38,44	39,31
3	32,30	40,10	54,11	41,28	34,96	39,89	46,24	45,79	41,52	34,80	49,50	49,80
4							70,00	70,00				
Year	2005				2006				2007			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			9,8	7,89			8,90	8,90			8,9	8,9
1	11,97	14,65	31,02	31,75	14,80	14,70	27,42	26,92	7,8	7,8	45,00	45,00
2	27,90	26,24	38,44	39,31	27,20	26,24	39,16	47,80	29,86	29,86	57,07	57,07
3	41,36	34,80	49,50	49,80	40,60	34,80	49,80	48,50	41,52	34,80	56,22	56,22
4												
Year	2008				2009				2010			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0				9,9			6,6	8,5				
1	11,0	11,0	26,8	24,40	10,2	19,3	28,0	32,7	25,60	15,51	25,37	27,75
2	29,8	29,8	35,6	56,0	24,0	25,8	30,1	32,0	37,20	29,99	38,55	39,88
3	56,0	56,0				39,8	51,5	55,7		47,00	45,50	62,20
4												
Year	2011				2012				2013			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0				8,90			6,58	6,66			4,30	9,56
1		20,33	22,14	30,50	27,24	22,81	28,86	38,52	12,44	14,48	22,97	27,68
2		37,75	37,50	35,61	36,24	40,54	40,30	49,59	32,87	30,21	38,87	46,38
3		52,00	52,00	52,00	37,22	46,77	48,33	59,15	42,40	40,71	45,24	57,93
4												
Year	2014				2015				2016			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			5,31	6,46			8,22	5,69			15,00	12,53
1	8,69	26,06	30,12	30,00	7,53	17,82	21,14	22,61	14,90	16,54	26,91	32,26
2	23,51	36,53	39,44	42,37	29,30	32,97	25,04	34,80	19,08	26,21	34,99	34,1
3	50,63	42,77	39,30		46,20	46,61	47,97	41,68	30,76	35,91	34,05	
4												
Year	2017				2018				2019			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			4,70	6,25			4,82					
1	18,17	17,11	23,69	24,11	6,05	15,56	25,62		4,57	10,44	5,28	6,70
2	30,95	25,85	34,38	37,59	15,78	25,21	39,50		13,58	17,67	21,12	21,54
3	23,69	27,21	41,52	49,92	28,59	30,13	48,75		33,40	25,40	36,12	40,29
4											50,79	
Year	2020				2021				2022			
Quarter of year	1	2	3	4	1	2	3	4	1	2	3	4
Age 0			5,18	5,85			3,55	6,16			5,45	5,20
1	5,88	14,68	21,87	24,70	14,40	16,69	21,90	24,55	5,95	19,21	24,02	29,21
2	7,64	19,64	33,05	33,33	19,15	26,72	31,70	35,35	20,80	32,29	34,62	41,08
3	20,10	28,78	36,99		30,03	31,63	38,46	39,08	27,30	40,47	31,46	49,99
4												
Year	2023				2024							
Quarter of year	1	2	3	4	1	2	3					
Age 0			3,12	4,15			4,08					
1	8,30	16,56	20,22	20,91	10,00	14,22	30,68					
2	20,83	30,76	30,88	35,58	29,60	30,72	38,89					
3	27,30	37,86	41,36	40,70	42,72	37,43	45,47					
4												

Mean weights at age from Danish and Norwegian landings from 2005-2008 uncertain because of few observations and use of values from 2004 and from adjacent quarters in the same year where observations have been missing. No mean weight at age data delivered by Norway in 2007-2008.
In general, mean weights at age are uncertain for quarters and countries where only very few fish have been caught. This problem is met by always calculating and using weighted mean weights at age, i.e. weighted by the catch number by country (Denmark and Norway) and quarter of year.

Table 12.2.6. Norway pout in Subarea 4 and Division 3.a. Mean weight at age in the stock, proportion mature, and natural mortality used in the assessment. From 2012 inter-benchmark and 2016 Benchmark Assessments.

Age	Weight (g)				Proportion mature	M	
	Q1	Q2	Q3	Q4		Quarterly	
0	-	-	4	6	0	0,29	
1	9	12	25	25	0,2	0,29	
2	25	25	40	40	1	0,39	
3	40	50	60	58	1	0,44	

Table 12.2.7. Norway pout in Subarea 4 and Division 3.a. Danish fishing effort (number of fishing days) and catch per unit effort (CPUE in tonnes / fishing day) per year and quarter of year (1987–2024) for main Danish fishery (métier) catching Norway pout. Data for fishing trips where the catch has consisted of at least 70% Norway pout.

Year	Metier	Effort (no fishing days) per quarter					CPUE (ton per fishing day) per quarter				
		1	2	3	4	Yearly	1	2	3	4	Yearly
1987	OTB_DEF_16-31_0_0	84		1240	2057	3381	12		53	136	71
1988		38		164	1773	1975	27		101	132	107
1989		28		664	940	1632	99		98	54	73
1990		49		134	914	1097	33		30	84	51
1991		18		395	972	1385	5		140	103	99
1992		136		1123	1645	2904	17		130	152	112
1993		153	6	1864	1718	3741	33	2	62	107	64
1994		35		543	1645	2223	2		91	131	89
1995		26		529	1591	2146	6		139	176	127
1996		6		520	521	1047	1		73	107	73
1997				733	1363	2096			137	99	115
1998		10		116	286	412	17		30	30	28
1999				192	869	1061			40	68	56
2000				140	2377	2517			107	168	142
2001		121			527	648	142			122	132
2002				488	790	1278			78	94	89
2003				72	252	324			19	52	36
2004		44		52	196	292	23		26	111	76
2006				39	1056	1095			57	137	117
2008		6		309	292	607	5		139	162	121
2009		20		176	35	231	46		165	181	148
2010			14	749	361	1124		74	169	295	210
2011				24	73	97			54	123	88
2012	OTB_DEF_16-31_2_35				549	549				123	123
2013			21	157	805	983		41	30	99	62
2014		33		263	681	977	28		66	47	50
2015		6	27	86	130	249	19	3	58	57	38
2016		6	10	27	263	306	43	5	44	46	34
2017		20		40	165	225	43		38	67	51
2018		11	1	6	136	154	34		28	45	45
2019		20	18	46	325	409	17	24	52	60	58
2020		72	35	25	346	477	50	30	41	69	73
2021		33	3	11	101	147	34	5	25	66	54
2022					143	143				43	43
2023		9			17	26	25			26	25
2024											

Table 12.2.8. Norway pout in Subarea 4 and Division 3.a. Fishing effort (number of fishing days) and catch per unit effort (CPUE in ton / fishing day) per year (2011–2024) and quarter of year for main Norwegian fishery (métiers) catching Norway pout.

		Fishing days					CPUE (ton/fishing day)				
Year	Metier	Q1	Q2	Q3	Q4	Yearly	Q1	Q2	Q3	Q4	Yearly
2011	OTB_DEF_16-31_0_0		1	23		24		10,00	24,09		23,50
2011	OTB_DEF_16-31_2_40		5	75		80		20,20	29,21		28,65
2012	OTB_DEF_16-31_0_0			3	24	27			15,73	35,38	33,19
2012	OTB_DEF_16-31_2_40			0	74	74				38,91	38,91
2013	OTB_DEF_16-31_0_0		101	163	99	363		31,27	29,90	47,18	34,99
2013	OTB_DEF_16-31_2_40		224	341	227	792		30,74	31,06	60,80	39,49
2014	OTB_DEF_16-31_0_0		62	64	57	183		18,20	35,07	33,86	28,98
2014	OTB_DEF_16-31_2_40		41	123	143	307		25,96	34,73	38,19	35,17
2015	OTB_DEF_16-31_0_0	0	130	308	71	509		38,29	37,76	38,73	38,03
2015	OTB_DEF_16-31_2_40	5	38	235	192	470	28,66	40,99	42,53	55,65	47,62
2016	OTB_DEF_16-31_0_0	0	269	269	51	589		24,08	22,96	22,61	23,44
2016	OTB_DEF_16-31_2_40	23	37	357	80	497	24,94	23,50	38,64	45,78	38,03
2017	OTB_DEF_16-31_0_0		125	198	15	338		28,71	22,46	25,56	24,91
2017	OTB_DEF_16-31_2_40		1	105	87	193		8,80	37,77	51,21	43,67
2018	OTB_DEF_16-31_0_0		128	163	43	334		23,54	22,37	19,14	22,40
2018	OTB_DEF_16-31_2_40		17	112	233	362		27,83	35,27	44,99	41,17
2019	OTB_DEF_16-31_0_0		243	526	112	881		31,57	37,92	34,05	35,67
2019	OTB_DEF_16-31_2_40		44	272	220	536		36,09	40,45	53,99	45,65
2020	OTB_DEF_16-31_0_0	2	172	445	67	686	25,00	38,51	38,56	24,75	37,16
2020	OTB_DEF_16-31_2_40	6	24	474	131	635	24,33	40,54	37,93	79,27	46,43
2021	OTB_DEF_16-31_0_0	0	272	303	25	600		28,29	28,46	14,51	27,80
2021	OTB_DEF_16-31_2_40	4	171	182	8	365	16,33	30,31	25,11	12,53	27,17
2022	OTB_DEF_16-31_0_0		97	260	84	441		29,16	22,80	21,25	23,90
2022	OTB_DEF_16-31_2_40		15	26	1	42		26,70	21,64	7,50	23,11
2023	OTB_DEF_16-31_0_0	1	177	324	64	566	3,00	31,44	31,04		29,78
2023	OTB_DEF_16-31_2_40	0	7	33	3	43		11,59	21,77		19,10
2024	OTB_DEF_16-31_0_0		7	24		31		9,25	15,72		14,26
2024	OTB_DEF_16-31_2_40										

Table 12.2.9. Norway pout in Subarea 4 and Division 3.a. Fishing effort (number of fishing days) and catch per unit effort (CPUE in ton per fishing day) per year and vessel horsepower (HP) class (1987–2024) for main Danish fishery (métier) catching Norway pout.

Year	Metier	Effort (no fishing days) per Vessel HP Class					CPUE (ton per fishing day) per vessel hp class				
		500-1000	1000-1500	1500-2000	>=2000	Yearly	500-1000	1000-1500	1500-2000	>=2000	Yearly
1987	OTB_DEF_16-31_0_0	2625	706	32	18	3381	117	129	82	4	83
1988		913	1000	53	9	1975	128	178	279	72	164
1989		897	707	14	14	1632	111	126	5	6	62
1990		615	448	24	10	1097	105	100	27	1	58
1991		671	688	26		1385	148	172	73		131
1992		1965	845	73	21	2904	195	239	73	18	131
1993		1773	1862	93	13	3741	117	122	63	12	78
1994		1009	1114	66	34	2223	165	221	94	14	123
1995		1068	884	167	27	2146	294	259	159	58	192
1996		452	544	32	19	1047	109	122	125	15	93
1997		1229	778	47	42	2096	192	206	58	55	128
1998		163	232		17	412	61	46		10	39
1999		619	357	51	34	1061	106	89	36	80	78
2000		1449	802	138	128	2517	205	188	110	202	177
2001		322	266		60	648	185	301		71	186
2002		738	393	135	12	1278	131	144	77	30	96
2003		172	115	24	13	324	64	45	43	48	50
2004		165	109		18	292	71	116		111	100
2006		465	464	166		1095	132	183	93		136
2008		320	287			607	189	213			201
2009		111	120			231	199	324			262
2010		279	606	239		1124	349	299	206		285
2011			97			97		121			121
2012	OTB_DEF_16-31_2_35	122	314	89	24	549	123	155	119	94	123
2013		331	504	108	40	983	81	144	84	64	93
2014		425	474	78		977	55	53	53		54
2015		21	228			249	66	52			59
2016		81	139	77	9	306	45	39	37	55	44
2017		72	124	14	15	225	42	41	91	93	67
2018		35	86	12	21	154	38	40	30	81	45
2019		102	227	34	47	410	68	36	59	70	58
2020		156	182	34	106	477	44	43	89	109	73
2021		8	63	2	75	147	24	19	72	90	54
2022					143	143				43	43
2023					26	26				25	25
2024											

Table 12.2.10. Norway pout in Subarea 4 and Division 3.a. Fishing effort (number of fishing days) and catch per unit effort (CPUE in ton / fishing day) per year (2011–2024) and quarter of year for main Norwegian fishery (métiers) catching Norway pout.

		Fishing days					CPUE (ton/fishing day)				
Year	Metier	500-1000	1000-1500	1500-2000	> 2000	Yearly	500-1000	1000-1500	1500-2000	> 2000	Yearly
2011	OTB_DEF_16-31_0_0		24		0	24		23,5			23,5
2011	OTB_DEF_16-31_2_40		20		60	80		18,3		32,1	28,6
2012	OTB_DEF_16-31_0_0	0	17	4	6	27		34,8	13,75	41,7	33,2
2012	OTB_DEF_16-31_2_40	19	28	0	27	74	21,2	26,9		63,8	38,9
2013	OTB_DEF_16-31_0_0		273	75	15	363		34,4	30,9	65,3	35,0
2013	OTB_DEF_16-31_2_40		162	130	500	792		23,2	34,10332	46,2	39,5
2014	OTB_DEF_16-31_0_0	0	142	16	25	183		25,5	16,6	56,4	29,0
2014	OTB_DEF_16-31_2_40	80	58	67	102	307	42,9	14,6	36,6	39,8	35,2
2015	OTB_DEF_16-31_0_0		228	106	175	509		33,7	42,7	40,8	38,0
2015	OTB_DEF_16-31_2_40		0	103	367	470			49,7	47,0	47,6
2016	OTB_DEF_16-31_0_0		207	136	246	589		25,5	21,0	23,0	23,4
2016	OTB_DEF_16-31_2_40		18	72	407	497		28,3	42,8	37,6	38,0
2017	OTB_DEF_16-31_0_0		123	107	108	338		24,7	21,4	28,6	24,9
2017	OTB_DEF_16-31_2_40		9	86	98	193		51,9	41,1	45,2	43,7
2018	OTB_DEF_16-31_0_0	40	121	107	66	334	20,9	20,2	22,1	27,8	22,4
2018	OTB_DEF_16-31_2_40	14	26	63	259	362	36,2	46,6	34,4	42,5	41,2
2019	OTB_DEF_16-31_0_0	144	232	171	334	881	27,3	29,5	32,4	45,3	35,7
2019	OTB_DEF_16-31_2_40	7	8	118	403	536	57,7	56,4	45,5	45,3	45,7
2020	OTB_DEF_16-31_0_0	146	133	118	289	686	28,1	33,9	31,8	45,5	37,2
2020	OTB_DEF_16-31_2_40	4	3	94	534	635	37,5	60,5	36,0	48,3	46,4
2021	OTB_DEF_16-31_0_0	128	122	141	209	600	25,9	26,2	23,6	32,7	27,8
2021	OTB_DEF_16-31_2_40	0	0	78	287	365			29,2	26,6	27,2
2022	OTB_DEF_16-31_0_0	217		84	140	441	23,6		17,9	28,0	23,9
2022	OTB_DEF_16-31_2_40	0		42	0	42			23,1		23,1
2023	OTB_DEF_16-31_0_0	266		93	207	566	24,5		22,7	39,7	29,8
2023	OTB_DEF_16-31_2_40	0		0	43	43				19,1	19,1
2024	OTB_DEF_16-31_0_0	4		6	21	31	7,5		9,6	16,9	14,3
2024	OTB_DEF_16-31_2_40										

Table 12.2.11. Norway pout in Subarea 4 and Division 3.a. Research vessel indices (CPUE in catch in number per trawl hour) of abundance for Norway pout.

Year	IBTS/IYFS[1] February (1st Q)			EGFS[2,3] August				SGFS[4] August				IBTS 3rd Quarter[1]			
	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group
1971	1556	22	-	-	-	-	-	-	-	-	-	-	-	-	-
1972	2589	856	8	-	-	-	-	-	-	-	-	-	-	-	-
1973	4207	438	-	-	-	-	-	-	-	-	-	-	-	-	-
1974	25559	388	24	-	-	-	-	-	-	-	-	-	-	-	-
1975	5067	1850	36	-	-	-	-	-	-	-	-	-	-	-	-
1976	4422	328	35	-	-	-	-	-	-	-	-	-	-	-	-
1977	6122	238	44	-	-	-	-	-	-	-	-	-	-	-	-
1978	1480	565	56	-	-	-	-	-	-	-	-	-	-	-	-
1979	2737	316	76	-	-	-	-	-	-	-	-	-	-	-	-
1980	3274	552	30	-	-	-	-	-	1928	346	12	-	-	-	-
1981	1092	377	14	-	-	-	-	-	185	127	9	-	-	-	-
1982	4511	266	81	-	-	-	-	8	991	44	22	-	-	-	-
1983	2252	592	13	-	-	-	-	13	490	91	1	-	-	-	-
1984	5000	956	89	-	-	-	-	2	615	69	8	-	-	-	-
1985	2342	1401	98	-	-	-	-	5	636	173	5	-	-	-	-
1986	2066	386	19	-	-	-	-	38	389	54	9	-	-	-	-
1987	3171	475	63	-	-	-	-	7	338	23	1	-	-	-	-
1988	123	710	25	-	-	-	-	14	38	209	4	-	-	-	-
1989	2017	254	170	-	-	-	-	2	382	21	14	-	-	-	-

Year	IBTS/IYFS[1] February (1st Q)			EGFS[2,3] August				SGFS[4] August				IBTS 3rd Quarter[1]			
	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group
1990	1295	712	70	-	-	-	-	58	206	51	2	-	-	-	-
1991	2428	693	157	-	-	-	-	10	732	42	6	7523	515	486	6
1992	5060	860	33	2975	6116	1710	303	12	1715	221	24	2560	4106	740	151
1993	2574	2643	346	3706	3582	1706	108	2	580	329	20	4080	1506	921	92
1994	1532	374	99	9487	1148	147	25	136	387	106	6	3196	685	114	21
1995	5951	757	85	5478	8374	282	62	37	2438	234	21	2864	4106	860	134
1996	915	2626	233	8241	1326	378	9	127	412	321	8	4559	672	419	41
1997	9633	1557	674	441	6295	372	102	1	2154	130	32	490	3308	345	76
1998	1009	5332	268	1391	377	340	3	2628	938	127	5	2931	791	745	23
1999	3522	601	668	10985	1175	40	29	3603	1784	179	37	7854	2316	230	106
2000	8034	1563	98	2267	9730	264	2	2094	6656	207	23	1644	7556	590	14
2001	1306	2805	288	2243	1434	1344	31	759	727	710	26	2089	1164	938	57
2002	1784	812	864	4939	1137	58	18	2559	1192	151	123	1974	749	76	52
2003	1241	573	94	323	572	75	5	1767	779	126	1	1812	1015	193	8
2004	903	364	37	278	557	109	6	731	719	175	19	773	590	209	14
2005	698	123	38	3395	414	67	15	3073	343	132	18	2679	395	104	18
2006	3400	113	23	1813	1996	124	20	1127	1285	69	9	1391	1800	197	14
2007	1287	769	31	1610	1181	720	43	5003	1023	395	8	4151	1186	430	40
2008	2438	461	154	628	1340	411	104	3456	1263	263	57	3035	1610	267	98
2009	5553	1582	123	4871	3500	306	5	5835	1750	202	16	5899	2454	358	14
2010	4954	1439	143	103	4257	559	13	1449	5101	930	29	842	4780	812	37

Year	IBTS/IYFS[1] February (1st Q)			EGFS[2,3] August				SGFS[4] August				IBTS 3rd Quarter[1]			
	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group	0-group	1-group	2-group	3-group
2011	545	2126	347	290	555	1050	40	1895	226	935	38	1801	474	1114	64
2012	1002	327	527	3946	505	99	59	10067	1070	159	216	6416	829	217	139
2013	4469	508	102	498	2592	117	19	1754	2888	107	22	1317	2759	186	18
2014	818	936	48	10157	483	268	17	24896	537	149	0	10238	480	253	13
2015	6638	570	130	1415	4320	60	15	10208	6568	118	0	3511	3911	191	47
2016	2404	909	41	7199	1710	314	4	14830	1696	290	0	8965	1386	279	14
2017	4332	421	173	1280	5061	134	38	7478	1906	77	2	4235	2502	158	25
2018	1139	850	147	5096	586	144	12	20632	674	246	3	6115	578	201	7
2019	3892	303	55	4286	1308	68	8	17856	3888	86	3	6464	2204	134	19
2020	6078	1121	83	3126	5343	227	8	36298	3417	530	0	8463	3858	612	10
2021	3823	1535	165	428	2868	544	12	13785	2870	402	3	4163	1504	296	48
2022	1599	801	160	6770	952	252	40	12218	2580	816	74	9496	888	284	40
2023	2519	286	65	563	1162	100	30	12001	1881	178	5	3754	1817	183	15
2024	574	818	100	178	123	90	3	4096	158	72	1				

[1]International Bottom Trawl Survey (IBTS), arithmetic mean catch in no./h in standard area. In general the quarter 1 (Q1) and quarter 3 (Q3) IBTS indices have been revised in 2012 and 2014 and 2015 and 2020 (see documentation on ICES DATRAS). The revised Q1 and Q3 IBTS survey indices introduced in 2020 are given, and used in the assessment. [2]English groundfish survey (EGFS): Arithmetic mean catch no./h. Data for 1996, 2001, 2002, and 2003 have been revised compared to the 2003 assessment. In 2007, numbers for 1997 and 1998 as well as 2002 has been adjusted based on new automatic calculation and processing process has been introduced. In September 2015, the EGFS Survey index was for all years and ages radically revised in order to incorporate the relevant primes within the Norway pout index area following the ICES IBTS manual (2015). [3]Minor GOV sweep changes in 2006 for the EGFS. [4]Scottish groundfish surveys (SGFS), arithmetic mean catch no./h. Survey design changed in 1998 and 2000. The SGFS survey area changed slightly in 2009 and onwards, which is evaluated to have no main effect for the Norway pout indices as the indices are weighted by sub-area. SGFS data for the full area, i.e. indices based on all hauls, are included in the presented indices. In September 2019, the indices from 2013 onwards for all age groups were corrected with removal of a few invalid hauls (including also the Q3 2019 survey) resulting in very minor changes of the indices for all age groups not affecting the assessment.

Table 12.3.1. Norway pout in Subarea 4 and Division 3.a. Tuning fleets and stock indices and tuning fleets used in the final 2004 benchmark assessment, in the 2005–2015 assessments, as well as in the 2016–2024 assessments based on the 2016 benchmark assessment, compared to the 2003 assessment. (Changes from previous period marked with grey).

		2003 ASSESSMENT	2004, 2005, April 2006 ASSESSMENT	Sept. 2006 ASSESSMENT	2007-2015 ASSESSMENTS	2016-2024 ASSESSMENTS
Recruiting season		3rd quarter	2nd quarter (SXSA)	3rd quarter (SMS); 2nd quarter (SXSA	2nd quarter (SXSA), autumn assessm.	3rd quarter SESAM (1984-2024)
Last season in last year		3rd quarter	2nd quarter (SXSA)	3rd quarter (SMS); 2nd quarter (SXSA	2nd quarter (SXSA), autumn assessm.	3rd quarter SESAM (1984-2024)
Plus-group		4+	4+ (SXSA)	None (SMS); 4+ (SXSA)	4+ (SXSA)	3+ (SESAM) (1984-2024)
FLT01: comm Q1						
	Year range	1982-2003	1982-2004	1982-2004	1983-2004, 2006	NOT USED
	Quarter	1	1	1	1	
	Ages	1-3	1-3	1-3	1-3	
FLT01: comm Q2			NOT USED	NOT USED	NOT USED	NOT USED
	Year range	1982-2003				
	Quarter	2				
	Ages	1-3				
FLT01: comm Q3						
	Year range	1982-2003	1982-2004	1982-2004	1983-2004, 2006	NOT USED
	Quarter	3	3	3	3	
	Ages	0-3	1-3	1-3	1-3	
FLT01: comm Q4						
	Year range	1982-2003	1982-2004	1982-2004	1983-2004, 2006	NOT USED
	Quarter	4	4	4	4	
	Ages	0-3	0-3	0-2 (SMS); 0-3 (SXSA)	0-3 (SXSA)	
FLT02: ibtsq1						
	Year range	1982-2003	1982-2006	1982-2006	1983-2015	1984-2024
	Quarter	1	1	1	1	1
	Ages	1-3	1-3	1-3	1-3	1-3
FLT03: egfs						
	Year range	1982-2003	1992-2005	1992-2005	1992-2015	1992-2024
	Quarter	3	Q3 -> Q2	Q3 -> Q2	Q3 -> Q2	3
	Ages	0-3	0-1	0-1	0-1	0-1
FLT04: sgfs						
	Year range	1982-2003	1998-2006	1998-2006	1998-2015	1998-2024
	Quarter	3	Q3 -> Q2	Q3 -> Q2	Q3 -> Q2	3
	Ages	0-3	0-1	0-1	0-1	0-1
FLT05: ibtsq3		NOT USED				
	Year range		1991-2005	1991-2005	1991-2014	1991-2023
	Quarter		3	3	Q3	3
	Ages		2-3	2-3	2-3	2-3

Table 12.3.2. Norway pout Subarea 4 and Division 3.aN (Skagerrak). Baseline run with SESAM seasonal stochastic assessment model. Settings and tuning fleets.

SURVIVORS ANALYSIS OF: Norway pout stock in September 2023

Run: September 2024 (NP_Sep2024_v2, www.stockassessment.org)

The following parameters were used:

Year range:	1984 - 2024
Seasons per year:	4
The last season in the last year is season:	3
Youngest age:	0
Oldest age:	2
Plus age:	3
Recruitment in season:	3
Spawning in season:	1

The following tuning fleets were included:

Fleet 2:	ibtsq1	(Age 1-3)
Fleet 3:	egfsq3	(Age 0-1)
Fleet 4:	sgfsq3	(Age 0-1)
Fleet 5:	ibtsq3	(Age 2-3)

Table 12.3.3. Norway pout Subarea 4 and Division 3.aN (Skagerrak). Baseline run with SESAM seasonal model September 2024. Estimated stock numbers in start of quarterly and yearly season.

Time\Age	0	1	2	3
1984	0	47416	10375	698
1984.25	0	32573	5829	405
1984.5	41360	22458	3417	234
1984.75	0	12805	1499	136
1985	0	22752	6508	695
1985.25	0	15494	3032	385
1985.5	30272	10997	1726	226
1985.75	0	6546	714	129
1986	0	16164	3370	347
1986.25	0	11138	1747	200
1986.5	50775	8136	1074	123
1986.75	0	5252	548	74

1987	0	29915	2981	318
1987.25	0	21929	1566	182
1987.5	10398	16315	961	112
1987.75	0	11082	511	70
1988	0	5266	6259	253
1988.25	0	4116	3782	144
1988.5	48533	3292	2608	87
1988.75	0	2500	1651	53
1989	0	26926	1647	944
1989.25	0	19726	1104	600
1989.5	49702	14444	743	384
1989.75	0	9740	435	248
1990	0	26750	5985	411
1990.25	0	19890	3546	255
1990.5	61062	14361	2100	157
1990.75	0	10063	1229	100
1991	0	33404	6641	765
1991.25	0	24319	3915	447
1991.5	110416	18223	2436	264
1991.75	0	12957	1406	168
1992	0	61633	8904	897
1992.25	0	44729	5644	609
1992.5	58324	32865	3861	421
1992.75	0	21995	2391	267
1993	0	31369	14039	1665
1993.25	0	21908	8035	1059
1993.5	50493	15321	4831	678
1993.75	0	9645	2506	415
1994	0	26299	5868	1500
1994.25	0	18391	3567	894

1994.5	145067	13201	2267	540
1994.75	0	9123	1358	334
1995	0	81467	6179	1080
1995.25	0	60563	3971	747
1995.5	57033	44577	2580	516
1995.75	0	30902	1614	332
1996	0	28668	20561	1279
1996.25	0	21685	12855	826
1996.5	122073	16092	8434	532
1996.75	0	11606	5289	335
1997	0	69072	8430	3703
1997.25	0	50575	5472	2384
1997.5	24047	39704	3610	1532
1997.75	0	28648	2173	979
1998	0	13425	20550	1974
1998.25	0	10138	12878	1214
1998.5	44004	7530	8209	744
1998.75	0	5722	5137	478
1999	0	25968	4200	3626
1999.25	0	19960	2890	2325
1999.5	104396	15258	1914	1475
1999.75	0	11419	1149	924
2000	0	61859	8464	1237
2000.25	0	47410	5869	773
2000.5	28670	37343	4030	478
2000.75	0	27101	2620	308
2001	0	15359	17959	1815
2001.25	0	11123	11164	1172
2001.5	29259	8053	7063	751
2001.75	0	5860	4814	482

2002	0	17044	4069	3372
2002.25	0	12706	2560	2075
2002.5	22948	9101	1689	1290
2002.75	0	6188	1068	816
2003	0	11719	3987	1114
2003.25	0	8119	2544	672
2003.5	8738	5601	1620	402
2003.75	0	3808	964	255
2004	0	4872	2671	684
2004.25	0	3496	1785	438
2004.5	8515	2650	1200	279
2004.75	0	1875	756	178
2005	0	4811	1280	562
2005.25	0	3539	897	379
2005.5	33892	2641	625	254
2005.75	0	2017	427	167
2006	0	19275	1593	392
2006.25	0	14181	1167	262
2006.5	24741	10712	828	172
2006.75	0	8068	536	110
2007	0	13863	5476	391
2007.25	0	10327	3623	273
2007.5	34897	7615	2392	192
2007.75	0	5651	1582	125
2008	0	20337	4368	1160
2008.25	0	15791	3102	757
2008.5	53420	12248	2145	496
2008.75	0	9627	1412	312
2009	0	34736	7170	1122
2009.25	0	26403	4900	701

2009.5	78411	20801	3300	435
2009.75	0	16026	2019	277
2010	0	47634	12638	1473
2010.25	0	38155	9776	954
2010.5	6841	28801	6881	611
2010.75	0	20540	4517	388
2011	0	4052	14352	3150
2011.25	0	3105	9207	1968
2011.5	11707	2491	6304	1244
2011.75	0	1914	4257	793
2012	0	6924	1488	3500
2012.25	0	5283	1046	2341
2012.5	59633	4129	752	1569
2012.75	0	3322	531	1033
2013	0	34994	2417	1010
2013.25	0	26810	1746	645
2013.5	17636	19268	1216	409
2013.75	0	13245	775	262
2014	0	9715	8287	587
2014.25	0	7165	5181	368
2014.5	97664	5305	3214	229
2014.75	0	3945	1932	142
2015	0	53262	2726	1225
2015.25	0	37600	1774	789
2015.5	36872	26064	1147	506
2015.75	0	16686	652	315
2016	0	19835	10455	561
2016.25	0	13823	6643	356
2016.5	65255	9296	4110	223
2016.75	0	5775	2443	137

2017	0	35252	3461	1492
2017.25	0	23998	2251	946
2017.5	21038	16366	1466	595
2017.75	0	10585	892	378
2018	0	10684	6655	762
2018.25	0	7727	4082	455
2018.5	75618	5478	2455	268
2018.75	0	3952	1445	164
2019	0	41061	2714	866
2019.25	0	30123	1911	546
2019.5	99331	21733	1219	335
2019.75	0	15536	741	208
2020	0	56021	10495	582
2020.25	0	40668	6870	373
2020.5	59646	29714	4337	234
2020.75	0	20519	2584	149
2021	0	31534	13238	1599
2021.25	0	22354	8212	1040
2021.5	23098	15528	4899	666
2021.75	0	10184	2927	422
2022	0	12528	6315	1882
2022.25	0	9656	3873	1186
2022.5	44552	7222	2398	742
2022.75	0	5069	1431	465
2023	0	23472	3360	1052
2023.25	0	17664	2183	662
2023.5	9360	12391	1403	416
2023.75	0	8418	862	268
2024	0	4574	5741	746
2024.25	0	2917	3648	483

2024.5	7469	2006	2383	312
2024.75	0	1477	1558	199

Table 12.3.4. Norway pout in Subarea 4 and Division 3.a. Baseline run with SESAM seasonal model September 2024. Estimated fishing mortalities by quarter of year. (The last 2024 quarter 4 F-value is a projection of F based on the population estimate by end of 3rd quarter).

Year\Age	0	1	2	3+
1984	0.001	0.325	0.918	0.339
1984.25	0.001	0.289	0.678	0.312
1984.5	0.010	1.020	1.757	0.320
1984.75	0.153	1.479	1.989	0.056
1985	0.001	0.406	1.147	0.423
1985.25	0.000	0.189	0.443	0.203
1985.5	0.009	0.953	1.641	0.299
1985.75	0.149	1.446	1.944	0.055
1986	0.001	0.336	0.950	0.350
1986.25	0.000	0.126	0.295	0.136
1986.5	0.006	0.587	1.012	0.184
1986.75	0.104	1.011	1.360	0.038
1987	0.001	0.292	0.826	0.305
1987.25	0.000	0.101	0.238	0.109
1987.5	0.004	0.456	0.785	0.143
1987.75	0.126	1.221	1.642	0.046
1988	0.001	0.216	0.612	0.226
1988.25	0.000	0.085	0.200	0.092
1988.5	0.003	0.327	0.564	0.103
1988.75	0.085	0.823	1.106	0.031
1989	0.000	0.160	0.452	0.167
1989.25	0.000	0.148	0.347	0.159
1989.5	0.004	0.437	0.753	0.137
1989.75	0.081	0.787	1.058	0.030
1990	0.001	0.208	0.587	0.217

1990.25	0.000	0.218	0.513	0.235
1990.5	0.003	0.351	0.605	0.110
1990.75	0.061	0.595	0.800	0.022
1991	0.001	0.233	0.659	0.243
1991.25	0.000	0.170	0.399	0.183
1991.5	0.004	0.364	0.628	0.114
1991.75	0.057	0.554	0.746	0.021
1992	0.001	0.211	0.595	0.219
1992.25	0.000	0.139	0.326	0.150
1992.5	0.004	0.373	0.643	0.117
1992.75	0.056	0.540	0.726	0.020
1993	0.000	0.180	0.509	0.188
1993.25	0.000	0.141	0.331	0.152
1993.5	0.004	0.440	0.758	0.138
1993.75	0.061	0.592	0.796	0.022
1994	0.000	0.185	0.522	0.193
1994.25	0.000	0.125	0.293	0.135
1994.5	0.004	0.391	0.673	0.123
1994.75	0.042	0.406	0.546	0.015
1995	0.000	0.118	0.334	0.123
1995.25	0.000	0.107	0.251	0.115
1995.5	0.002	0.239	0.412	0.075
1995.75	0.034	0.330	0.444	0.012
1996	0.000	0.083	0.235	0.087
1996.25	0.000	0.068	0.160	0.073
1996.5	0.003	0.306	0.526	0.096
1996.75	0.030	0.291	0.392	0.011
1997	0.000	0.066	0.186	0.069
1997.25	0.000	0.045	0.105	0.048
1997.5	0.003	0.305	0.525	0.096

1997.75	0.035	0.335	0.450	0.013
1998	0.000	0.064	0.180	0.066
1998.25	0.000	0.064	0.149	0.069
1998.5	0.002	0.236	0.406	0.074
1998.75	0.033	0.322	0.434	0.012
1999	0.000	0.051	0.144	0.053
1999.25	0.000	0.075	0.176	0.081
1999.5	0.003	0.269	0.463	0.084
1999.75	0.039	0.378	0.509	0.014
2000	0.000	0.049	0.137	0.051
2000.25	0.000	0.057	0.133	0.061
2000.5	0.002	0.176	0.303	0.055
2000.75	0.045	0.437	0.587	0.016
2001	0.000	0.061	0.172	0.063
2001.25	0.000	0.052	0.122	0.056
2001.5	0.001	0.097	0.167	0.031
2001.75	0.038	0.370	0.497	0.014
2002	0.000	0.059	0.166	0.061
2002.25	0.000	0.043	0.101	0.046
2002.5	0.002	0.222	0.383	0.070
2002.75	0.049	0.478	0.643	0.018
2003	0.000	0.036	0.102	0.038
2003.25	0.000	0.032	0.075	0.035
2003.5	0.002	0.198	0.342	0.062
2003.75	0.034	0.327	0.440	0.012
2004	0.000	0.028	0.079	0.029
2004.25	0.000	0.017	0.040	0.018
2004.5	0.001	0.152	0.261	0.048
2004.75	0.035	0.339	0.456	0.013
2005	0.000	0.000	0.000	0.000

2005.25	0.000	0.000	0.000	0.000
2005.5	0.000	0.000	0.001	0.000
2005.75	0.000	0.001	0.001	0.000
2006	0.000	0.018	0.071	0.024
2006.25	0.000	0.040	0.104	0.047
2006.5	0.001	0.110	0.234	0.046
2006.75	0.036	0.474	0.671	0.018
2007	0.000	0.004	0.015	0.005
2007.25	0.000	0.015	0.038	0.017
2007.5	0.000	0.027	0.059	0.012
2007.75	0.001	0.022	0.032	0.001
2008	0.000	0.002	0.007	0.002
2008.25	0.000	0.017	0.041	0.018
2008.5	0.000	0.051	0.110	0.022
2008.75	0.004	0.058	0.083	0.002
2009	0.000	0.001	0.004	0.001
2009.25	0.000	0.017	0.041	0.018
2009.5	0.001	0.116	0.252	0.050
2009.75	0.004	0.063	0.090	0.002
2010	0.000	0.000	0.002	0.001
2010.25	0.000	0.026	0.064	0.028
2010.5	0.001	0.099	0.214	0.042
2010.75	0.006	0.097	0.139	0.003
2011	0.000	0.000	0.002	0.001
2011.25	0.000	0.006	0.014	0.006
2011.5	0.000	0.047	0.102	0.020
2011.75	0.007	0.103	0.147	0.004
2012	0.000	0.000	0.002	0.000
2012.25	0.000	0.008	0.020	0.009
2012.5	0.000	0.034	0.073	0.014

2012.75	0.023	0.355	0.510	0.013
2013	0.000	0.001	0.003	0.001
2013.25	0.000	0.026	0.064	0.028
2013.5	0.001	0.115	0.250	0.049
2013.75	0.033	0.500	0.717	0.018
2014	0.000	0.002	0.010	0.003
2014.25	0.000	0.027	0.066	0.029
2014.5	0.001	0.160	0.347	0.068
2014.75	0.024	0.363	0.521	0.013
2015	0.000	0.003	0.012	0.004
2015.25	0.000	0.035	0.085	0.037
2015.5	0.001	0.208	0.452	0.089
2015.75	0.021	0.326	0.467	0.012
2016	0.000	0.003	0.012	0.004
2016.25	0.000	0.047	0.116	0.051
2016.5	0.001	0.208	0.451	0.089
2016.75	0.024	0.363	0.521	0.013
2017	0.000	0.002	0.007	0.002
2017.25	0.000	0.041	0.099	0.044
2017.5	0.001	0.178	0.385	0.076
2017.75	0.024	0.361	0.518	0.013
2018	0.000	0.002	0.009	0.003
2018.25	0.000	0.059	0.145	0.064
2018.5	0.001	0.171	0.371	0.073
2018.75	0.027	0.410	0.588	0.015
2019	0.000	0.005	0.020	0.006
2019.25	0.000	0.090	0.218	0.096
2019.5	0.001	0.211	0.458	0.090
2019.75	0.025	0.378	0.542	0.013
2020	0.000	0.011	0.043	0.013

2020.25	0.000	0.067	0.164	0.072
2020.5	0.001	0.195	0.424	0.083
2020.75	0.027	0.415	0.594	0.015
2021	0.000	0.007	0.030	0.009
2021.25	0.000	0.056	0.137	0.060
2021.5	0.001	0.158	0.343	0.067
2021.75	0.028	0.421	0.604	0.015
2022	0.000	0.003	0.012	0.004
2022.25	0.000	0.032	0.079	0.035
2022.5	0.001	0.135	0.293	0.058
2022.75	0.023	0.343	0.492	0.012
2023	0.000	0.003	0.011	0.003
2023.25	0.000	0.019	0.047	0.021
2023.5	0.001	0.117	0.253	0.050
2023.75	0.010	0.147	0.211	0.005
2024	0.000	0.003	0.011	0.003
2024.25	0.000	0.005	0.011	0.005
2024.5	0.000	0.065	0.141	0.028
2024.75	0.010	0.147	0.211	0.005

Table 12.3.5. Norway pout in Subarea 4 and Division 3.a. Baseline run with SESAM seasonal model September 2024. Diagnostics of the SESAM baseline assessment. Estimated catchabilities by survey tuning fleet.

Fleet number	Age	Catchability	Low	High
2	1	0.11605	0.06858	0.19639
2	2	0.16620	0.08876	0.31118
2	3	0.15818	0.06489	0.38556
3	0	0.06159	0.03438	0.11034
3	1	0.16588	0.09059	0.30373
4	0	0.19601	0.10475	0.36675
4	1	0.18130	0.09480	0.34673
5	2	0.17813	0.08374	0.37892

5	3	0.08668	0.03396	0.22124

Table 12.3.6. Norway pout in Subarea 4 and Division 3.a. Stock Summary Table. Baseline run with SESAM September 2024. Estimated yearly and quarterly recruitment (millions), spawning-stock biomass SSB (t), total-stock biomass TSB (t) and fishing mortality for ages 1–2 ($F_{1–2}$).

Time	Re-cruits	Low	High	SSB	Low	High	TSB	Low	High	F12	Low	High
1984				372645	214974	645958	714037	432009	1180182	1.057	0.574	1.946
1984.25				244154	138529	430315	556855	327282	947463			
1984.5	41360	21492	79595	263030	148425	466124	712203	411954	1231286			
1984.75				131851	68528	253686	387965	213581	704730			
1985				231439	125576	426546	395251	232138	672977	1.021	0.517	2.015
1985.25				132267	69192	252838	281014	159646	494650			
1985.5	30272	15589	58783	137593	74523	254039	357530	204703	624456			
1985.75				68783	33882	139635	199700	107084	372421			
1986				127202	66623	242863	243584	137164	432572	0.710	0.361	1.396
1986.25				80428	40479	159804	187357	102013	344101			
1986.5	50775	25737	100172	91005	47404	174708	253724	139302	462130			
1986.75				52462	25722	107001	157504	83045	298721			
1987				141104	77543	256765	356495	199825	636000	0.695	0.341	1.417
1987.25				100873	53865	188902	311390	169012	573708			
1987.5	10398	5085	21263	126780	69178	232345	453093	247066	830924			
1987.75				79892	42052	151783	301541	160713	565769			
1988				176105	87346	355058	214023	112662	406580	0.492	0.260	0.928
1988.25				111603	52706	236319	151114	77932	293019			
1988.5	48533	24588	95796	125977	59352	267391	191830	100868	364820			
1988.75				81622	36224	183916	131623	66754	259530			
1989				127407	67029	242169	321270	176443	584974	0.518	0.272	0.986
1989.25				104944	54037	203808	294312	159723	542310			
1989.5	49702	25052	98608	124975	65921	236933	413866	224518	762904			
1989.75				80490	40840	158634	275303	146001	519119			
1990				214221	116216	394873	406819	230821	717011	0.485	0.255	0.922

1990.25				149138	78766	282384	340078	187803	615821			
1990.5	61062	30645	121668	165216	86348	316121	452444	245395	834189			
1990.75				105242	52892	209406	306505	162361	578618			
1991				256764	139157	473765	497276	279767	883890	0.469	0.244	0.901
1991.25				178576	93681	340404	412038	224796	755243			
1991.5	110416	55385	220128	204434	107336	389368	568897	307044	1054063			
1991.75				130757	65818	259768	389899	205148	741033			
1992				369423	201531	677182	813184	452666	1460832	0.444	0.229	0.860
1992.25				278906	146750	530077	708307	383058	1309722			
1992.5	58324	29641	114765	344007	179568	659029	1001312	537081	1866804			
1992.75				221079	109214	447524	660985	343292	1272678			
1993				474036	242462	926782	699893	379670	1290202	0.468	0.218	1.005
1993.25				306399	150776	622648	516716	274027	974337			
1993.5	50493	25320	100693	310497	152800	630946	616918	328542	1158415			
1993.75				172541	78931	377167	365440	184998	721881			
1994				254040	126843	508791	443397	235472	834922	0.393	0.188	0.818
1994.25				178003	85394	371044	354554	183264	685943			
1994.5	145067	71702	293501	189097	92054	388442	453114	235168	873045			
1994.75				119260	54471	261108	301718	149218	610071			
1995				344307	179358	660954	930870	488825	1772656	0.280	0.134	0.583
1995.25				281966	143037	555834	863371	443441	1680968			
1995.5	57033	27981	116250	357058	180420	706633	1248603	636230	2450387			
1995.75				238318	116238	488614	856364	424821	1726280			
1996				616787	303691	1252678	823199	427101	1586642	0.258	0.121	0.547
1996.25				414705	198774	865204	622881	318770	1217118			
1996.5	122073	59338	251136	449775	213587	947143	771628	394622	1508811			
1996.75				288995	126721	659072	521127	251172	1081223			
1997				483191	236580	986869	980507	503408	1909773	0.252	0.116	0.548
1997.25				377394	181413	785091	862910	437596	1701603			
1997.5	24047	11628	49727	434817	213934	883756	1228910	623539	2422011			
1997.75				286948	134020	614378	859920	417198	1772449			

1998				616860	290426	1310200	713519	349126	1458240	0.232	0.108	0.499
1998.25				406982	187692	882482	504311	245120	1037576			
1998.5	44004	21734	89093	410626	187585	898862	561228	274754	1146397			
1998.75				261771	112043	611588	376209	175331	807233			
1999				296775	137092	642455	483744	241676	968275	0.258	0.118	0.564
1999.25				236413	107140	521664	428031	212567	861895			
1999.5	104396	51220	212778	241324	112498	517674	546494	275628	1083546			
1999.75				156690	70385	348822	385070	186954	793133			
2000				372429	185858	746285	817815	422046	1584713	0.235	0.105	0.525
2000.25				299147	147643	606117	754284	383801	1482395			
2000.5	28670	14016	58646	376624	185893	763052	1123493	565713	2231231			
2000.75				258162	122666	543325	800196	390582	1639383			
2001				549219	256749	1174849	659807	321400	1354528	0.192	0.085	0.437
2001.25				364382	165798	800822	471163	226661	979411			
2001.5	29259	14317	59794	367854	165860	815849	528918	256024	1092689			
2001.75				249794	108018	577655	367008	172369	781434			
2002				267299	120243	594206	390015	188370	807514	0.262	0.110	0.626
2002.25				198260	87095	451309	320237	153349	668750			
2002.5	22948	10890	48356	190453	86198	420805	372475	183304	756871			
2002.75				120972	52488	278812	244742	116458	514339			
2003				165339	76884	355563	249714	122935	507238	0.194	0.080	0.471
2003.25				116677	53541	254267	194623	95527	396517			
2003.5	8738	4186	18240	116963	54513	250958	228981	114079	459616			
2003.75				72385	32141	163021	148554	71131	310249			
2004				102933	47927	221072	138010	67377	282688	0.172	0.067	0.441
2004.25				74895	34119	164407	108453	52397	224483			
2004.5	8515	4078	17778	78009	35767	170138	131019	64044	268033			
2004.75				49940	21886	113955	87438	41216	185494			
2005				63137	28991	137502	97779	47629	200731	0.000	0.000	0.001
2005.25				49879	22498	110581	83858	40519	173552			
2005.5	33892	16265	70621	53427	24428	116851	106248	51913	217452			

2005.75				36808	16666	81293	77152	37333	159443			
2006				90196	46292	175738	228973	116848	448690	0.215	0.080	0.581
2006.25				76295	38482	151264	212432	107067	421485			
2006.5	24741	11797	51889	96978	48501	193907	311214	155453	623045			
2006.75				68194	33004	140905	229555	111158	474062			
2007				177467	82532	381603	277278	136428	563544	0.027	0.011	0.063
2007.25				129019	59421	280133	228161	111379	467391			
2007.5	34897	16654	73122	145292	66613	316902	297595	144544	612705			
2007.75				98794	44174	220950	211819	100552	446212			
2008				192201	93211	396318	338629	170408	672912	0.046	0.020	0.108
2008.25				153307	73009	321917	304900	150863	616212			
2008.5	53420	25201	113236	176837	83748	373396	421806	206254	862626			
2008.75				122709	56467	266657	315261	149099	666601			
2009				286642	139155	590448	536739	270017	1066928	0.073	0.030	0.180
2009.25				220899	106649	457543	474372	236557	951267			
2009.5	78411	37476	164060	262093	126518	542948	678119	335313	1371390			
2009.75				176969	82177	381105	497486	236746	1045396			
2010				460620	223449	949527	803583	405432	1592733	0.080	0.034	0.191
2010.25				383697	181430	811460	749984	369529	1522140			
2010.5	6841	3209	14583	455894	212565	977767	1031927	501782	2122184			
2010.75				305917	136460	685805	716724	336933	1524613			
2011				492088	226987	1066804	521261	243906	1114011	0.053	0.022	0.128
2011.25				336043	152267	741623	365853	169266	790761			
2011.5	11707	5620	24389	339240	151429	759987	389072	179394	843823			
2011.75				225851	97011	525805	264143	118042	591073			
2012				189637	82696	434873	239488	110732	517957	0.125	0.048	0.327
2012.25				155857	65874	368758	206572	94205	452969			
2012.5	59633	28790	123519	144828	62033	338129	227411	106991	483363			
2012.75				97765	41275	231569	164212	76508	352452			
2013				163811	80015	335360	415765	207603	832648	0.209	0.078	0.559
2013.25				140242	68091	288845	397617	196323	805301			

2013.5	17636	8504	36576	169522	83376	344674	554881	275829	1116247			
2013.75				112402	54129	233410	377300	184719	770657			
2014				248146	115557	532865	318092	155426	651000	0.187	0.074	0.472
2014.25				165120	77016	354015	233906	115516	473631			
2014.5	97664	45589	209225	168847	78977	360983	274956	137134	551289			
2014.75				105240	46586	237742	184153	87926	385692			
2015				213028	103437	438728	596516	291990	1218641	0.198	0.076	0.515
2015.25				174055	84622	358006	535018	262414	1090810			
2015.5	36872	17178	79147	206583	101745	419442	727858	359818	1472345			
2015.75				127786	60634	269308	461514	222005	959416			
2016				319533	151643	673304	462348	229887	929873	0.215	0.082	0.563
2016.25				217066	102941	457714	349767	174666	700407			
2016.5	65255	30272	140666	224231	105830	475096	410151	205165	819943			
2016.75				134540	58745	308127	250044	118577	527269			
2017				209645	99533	441573	463461	227735	943184	0.199	0.077	0.514
2017.25				161165	76426	339858	391544	193173	793621			
2017.5	21038	10052	44031	176201	85044	365066	503520	250147	1013534			
2017.75				110501	51097	238968	322214	155605	667213			
2018				216080	101516	459934	293003	145104	591651	0.219	0.087	0.554
2018.25				143358	67513	304409	217536	108944	434372			
2018.5	75618	36702	155796	141655	66534	301591	251221	126464	499052			
2018.75				87080	38835	195257	166135	80539	342701			
2019				176409	87889	354086	472051	240055	928258	0.240	0.100	0.577
2019.25				147390	73599	295167	436573	221560	860248			
2019.5	99331	47987	205611	177565	88804	355044	612229	309065	1212770			
2019.75				119363	57189	249129	430097	209298	883831			
2020				386515	189978	786372	789864	402219	1551108	0.239	0.096	0.592
2020.25				287985	142169	583356	678395	344391	1336329			
2020.5	59646	27808	127934	336055	165848	680943	930345	468386	1847924			
2020.75				214579	100678	457343	624965	302793	1289930			
2021				451672	211326	965369	678715	333702	1380437	0.220	0.084	0.575

2021.25				310942	145630	663907	525537	259592	1063933			
2021.5	23098	10912	48893	313582	147298	667586	624146	309389	1259122			
2021.75				192480	85977	430910	396170	189747	827158			
2022				255700	116147	562929	345901	165719	721991	0.174	0.066	0.456
2022.25				179301	80916	397314	271997	130787	565668			
2022.5	44552	20828	95297	176567	80667	386476	321021	156356	659101			
2022.75				109545	48020	249898	210935	99556	446922			
2023				168345	79853	354903	337346	167030	681328	0.101	0.039	0.258
2023.25				130060	61537	274887	299637	146742	611839			
2023.5	9360	4184	20938	143050	68494	298763	390876	191193	799108			
2023.75				92135	42431	200060	260501	122835	552452			
2024				181613	83522	394906	214549	102433	449376			
2024.25				122353	54672	273820	150352	70533	320498			
2024.5	7469	2572	21690	124066	53745	286396	164180	76065	354371			
2024.75				81662	33544	198802	111196	49464	249969			

Table 12.3.6 (cont.). Norway pout in Subarea 4 and Division 3.a. Stock Summary Table. Baseline run with SESAM September 2024. Long-term arithmetic means of yearly recruitment (millions), quarterly spawning-stock biomass SSB (t), quarterly total-stock biomass TSB (t) and yearly fishing mortality for ages 1–2 (F_{bar}=$F_{1–2}$) for the period 1984–2024. Numbers are given for start of the season.

	value
Avg. recruitment	47979.71
Geom. mean recruitment	36226.89
Avg SSB Q 1	280536.80
Avg SSB Q 2	202930.35
Avg SSB Q 3	222893.29
Avg SSB Q 4	142640.78
Avg TSB Q 1	481067.59
Avg TSB Q 2	398975.84
Avg TSB Q 3	523059.92
Avg TSB Q 4	351131.39
Avg. FBAR	0.30

Table 12.6.1. Norway pout in Subarea 4 and Division 3.a. Projected mean weight at age used in the forecast by quarter of year.

Age/Quarter	1	2	3	4
0	1.941	5.731	3.926	5.156
1	9.152	13.814	24.575	25.252
2	24.476	28.293	36.865	37.156
3	36.652	37.446	44.574	44.011

Table 12.6.2. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that the fifth percentile of the SSB distribution one year ahead (1st October 2025) equals B_{lim}.

Basis:
Fbar (2023 up to Q4) = estimated from in year assessment 1st October 2024, F(age1–2, quarter4 2023 and quarter1,2,3 2024) = 0.30, average from Table 12.3.4 and Table 12.3.6..
SSB (2024 up to Q4) = estimated from in year assessment 1st October 2024 (start Q4) = 81 662 tonnes, Table 12.3.6;
R(2024) = estimated / observed from in year assessment 1st July 2024 (age 0 in start of Q3) = 7 469 million, Table 12.3.6;
Biological parameters (2024–2025): Assume values for M, weight-at-age in the stock, and maturity-at-age for the projection period to be similar to the same parameter values used in the assessment. Assume projected mean weight at ages in the catches by quarter as given in Table 12.6.1.
F, R (Q4 2023 - Q4 2024): (i) Draw K samples from the joint posterior distribution of the states (log N and log F) in the last year with data, and the recruitment in all years. (ii) Assume that log F_t = log F_{t-4} + log G_t, for all future values of t where G_t is some chosen vector of multipliers of the F-process. If G_t = 1 for all t this corresponds to assuming the same level and quarterly pattern in F for all future time-steps as in the last data year. (iii) Create K forecasting trajectories starting from the samples of joint posterior distribution of the states. This is done by sampling K recruitments from the vector of historic recruitments obtained in step 2, and then projecting the states forward in time using the stock equation with randomly sampled process errors from their estimated distribution. (iv) Find G_t such that the fifth (or any other) percentile of the catches (total mass) in the projections equals some desired level such as B_{lim} (optional).

	F_{1-2}	SSB	SSB 5_{th} quantile	median catch
2024.75	0.0012	82772.5364	40025.9277	26.8779
2025	0.0000	88553.3125	43603.6487	0.8462
2025.25	0.0001	70235.8646	32178.2980	0.9362
2025.5	0.0007	69108.2050	30494.0571	11.4349
2025.75		46795.8708	20092.1317	
Sum				40.0952

Table 12.6.3. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to zero (no catch) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5^{th} quantile	median catch
2024.75	0.0000	82772.5364	40025.9277	0.0000
2025	0.0000	88569.9331	43628.3625	0.0000
2025.25	0.0000	70262.1640	32190.0034	0.0000
2025.5	0.0000	69126.0140	30503.4053	0.0000

2025.75		46830.8039	20111.5009	
Sum				0.0000

Table 12.6.4. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to F status quo for the previous year up to 1st October 2025.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	0.1817	82772.5364	40025.9277	3880.1280
2025	0.0070	83753.2444	39747.0735	119.9963
2025.25	0.0081	66777.2711	29475.2964	131.1828
2025.5	0.1037	65871.4549	28084.0462	1628.7275
2025.75		43688.5591	17774.5578	
Sum				5760.0346

Table 12.6.5. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that the median of the SSB distribution one year a head (1st October 2025) equals B_{lim}.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	0.2458	82772.5364	40025.9277	5202.1134
2025	0.0095	82095.6797	38492.1475	160.3077
2025.25	0.0109	65448.3749	28626.7996	174.2780
2025.5	0.1402	64771.9311	27362.0903	2168.0796
2025.75		42573.0000	17075.2132	
Sum				7704.7787

Table 12.6.6. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that SSB one year a head (1st October 2025) equals B_{pa}.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	0.0012	82772.5364	40025.9277	26.8779
2025	0.0000	88553.3125	43603.6487	0.8462
2025.25	0.0001	70235.8646	32178.2980	0.9362
2025.5	0.0007	69108.2050	30494.0571	11.4349
2025.75		46795.8708	20092.1317	

Sum				40.0952

Table 12.6.7. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.2 (F_{cap} = 0.2) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	$F_{1\text{-}2}$	SSB	SSB 5th quantile	median catch
2024.75	0.4907	82772.5364	40025.9277	10054.1211
2025	0.0190	76990.6303	33424.5889	301.4089
2025.25	0.0219	60913.5399	25269.2485	328.3970
2025.5	0.2800	60766.5494	24268.2528	4086.5045
2025.75		38695.3150	14593.2922	
Sum				14770.4315

Table 12.6.8. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.3 (F_{cap} = 0.3) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	$F_{1\text{-}2}$	SSB	SSB 5th quantile	median catch
2024.75	0.7361	82772.5364	40025.9277	14630.2943
2025	0.0285	72460.1680	29234.6463	426.9874
2025.25	0.0328	57085.2384	22128.5358	468.6096
2025.5	0.4200	57470.3942	21802.2922	5811.6783
2025.75		35475.1751	12666.0927	
Sum				21337.5697

Table 12.6.9. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.4 (F_{cap} = 0.4) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	$F_{1\text{-}2}$	SSB	SSB 5th quantile	median catch
2024.75	0.9814	82772.5364	40025.9277	18851.5422
2025	0.0380	68730.1945	25117.8703	538.0885
2025.25	0.0437	54047.1112	19869.3065	597.9986
2025.5	0.5599	54458.7246	19334.6199	7370.8825
2025.75		32788.1403	10984.3540	
Sum				27358.5118

Table 12.6.10 Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.5 (F_{cap} = 0.5) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	1.2268	82772.5364	40025.9277	22724.5216
2025	0.0475	64853.5620	22051.7369	634.8237
2025.25	0.0546	50981.6567	17728.9194	713.4490
2025.5	0.6999	51554.5695	17701.5398	8786.7073
2025.75		30475.9616	9405.2690	
Sum				32859.5016

Table 12.6.11. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.6 (F_{cap} = 0.6) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above.

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	1.4722	82772.5364	40025.9277	26347.0045
2025	0.0569	61392.0832	19270.9919	727.0739
2025.25	0.0656	48451.5081	15673.4734	825.2951
2025.5	0.8399	48908.0854	16097.1169	9994.8354
2025.75		28130.7746	8267.9119	
Sum				37894.2088

Table 12.6.12. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.7 (F_{cap} = 0.7) for the period 1st October 2024 to 1st October 2025.

Basis: Same as above

	F_{1-2}	SSB	SSB 5th quantile	median catch
2024.75	1.7175	82772.5364	40025.9277	29765.6336
2025	0.0664	58290.5590	17319.3631	810.7687
2025.25	0.0765	45882.7058	14133.8377	926.2515
2025.5	0.9799	46641.6992	14643.4936	11156.4776
2025.75		26151.9951	7272.4831	
Sum				42659.1313

Table 12.6.13. Norway pout in Subarea 4 and Division 3.a. The quarterly minima of the estimated SSB time-series (1984–2016) from the SESAM Benchmark Assessment Baseline Run from the Norway pout benchmark assessment under ICES WKPOUT 2016 with previous to 2020 IBTS Q1 and Q3 survey indices. The estimates are quarterly minima in tonnes

estimated at the beginning of the season. The estimates are B_{loss} estimates which equals B_{lim} according to the ICES WKPOUT 2016 benchmark assessment which by 1st October is B_{lim}=39 450 t.

SSB	Quarter	Year
72101.23	1	2005
55109.70	2	2005
57961.80	3	2005
39447.18	4	2005

Table 12.6.14. Norway pout in Subarea 4 and Division 3.a. The quarterly minima of the estimated SSB time-series (1984–2016) from the SESAM updated Benchmark Assessment Run (Run: NP_Sep17_fixC_Benchmark2016Data_NewIBTS, www.stockassessment.org) with new IBTS Q1 and Q3 survey indices made available in 2020. The estimates are quarterly minima in tonnes estimated at the beginning of the season. The estimates are B_{loss} estimates which equals B_{lim} according to the assessment run above which by 1st October is B_{lim}=42 573 t.

SSB	Quarter	Year
77586	1	2005
59514	2	2005
62543	3	2005
42573	4	2005

12.13 Figures

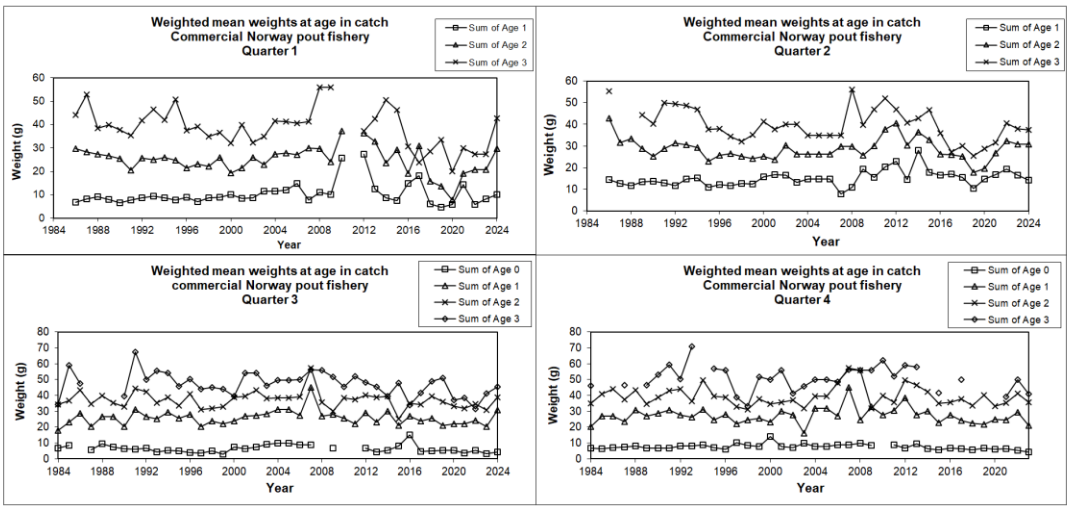

Figure 12.2.1. Norway pout in Subarea 4 and Division 3.a. Weighted mean weights at age in catch of the Danish and Norwegian commercial fishery for Norway pout by quarter of year during the period 1984–2024.

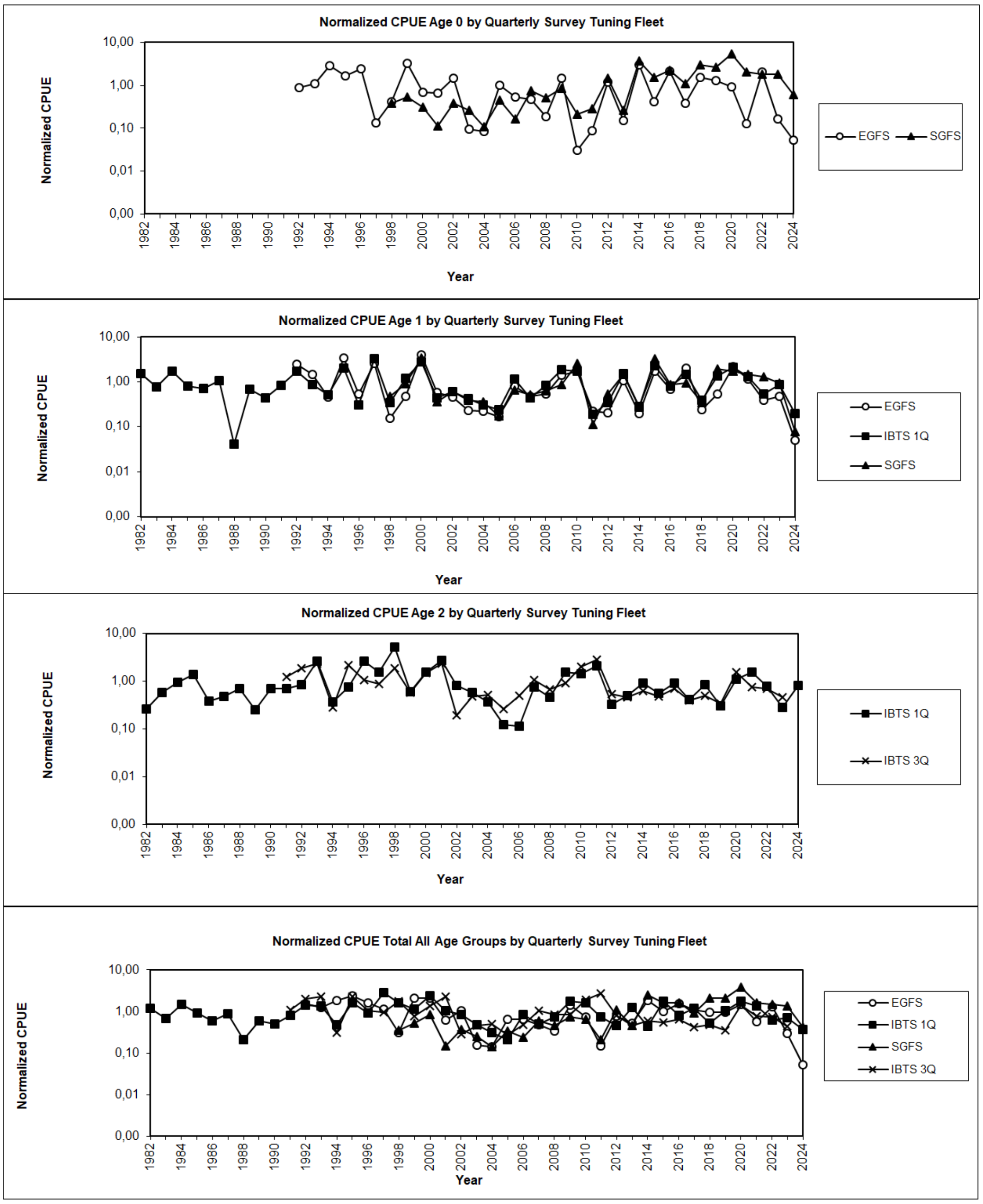

Figure 12.2.2. Norway pout in Subarea 4 and Division 3.a. Trends in CPUE (normalized to unit mean) by quarterly survey tuning fleet used in the Norway pout assessment for each age group and all age groups together.

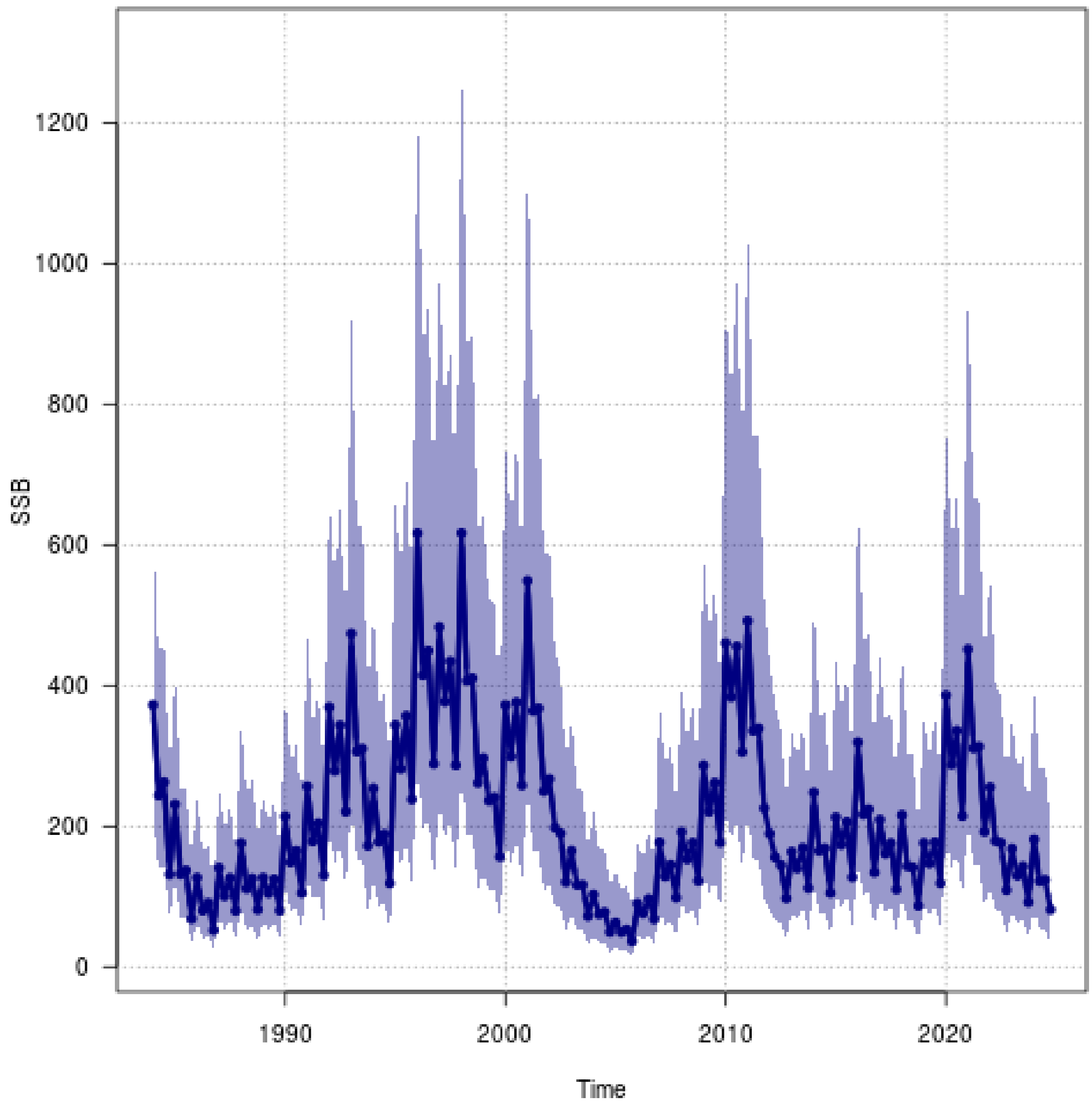

Figure 12.3.1. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: SSB (t), quarterly. SESAM baseline run September 2024. Quarterly estimated SSB and confidence interval from SESAM (blue) where connecting lines are interpolations.

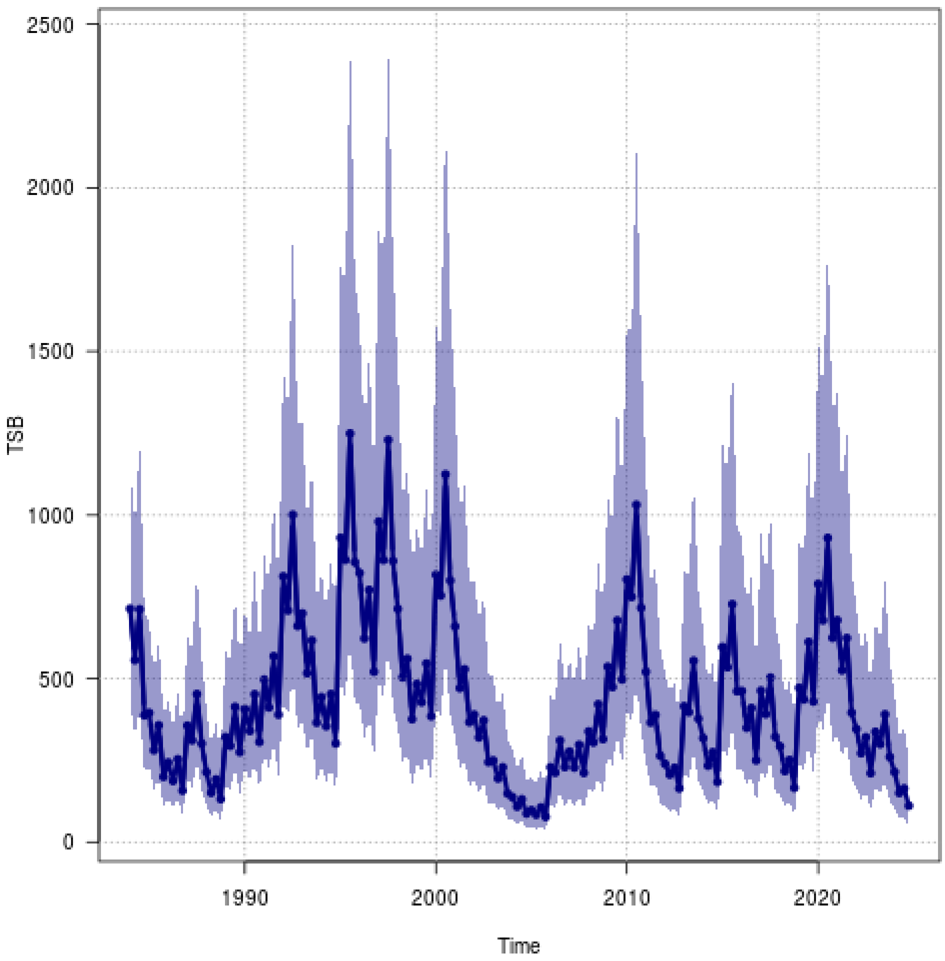

Figure 12.3.2. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: TSB (t), quarterly. SESAM baseline run September 2024.

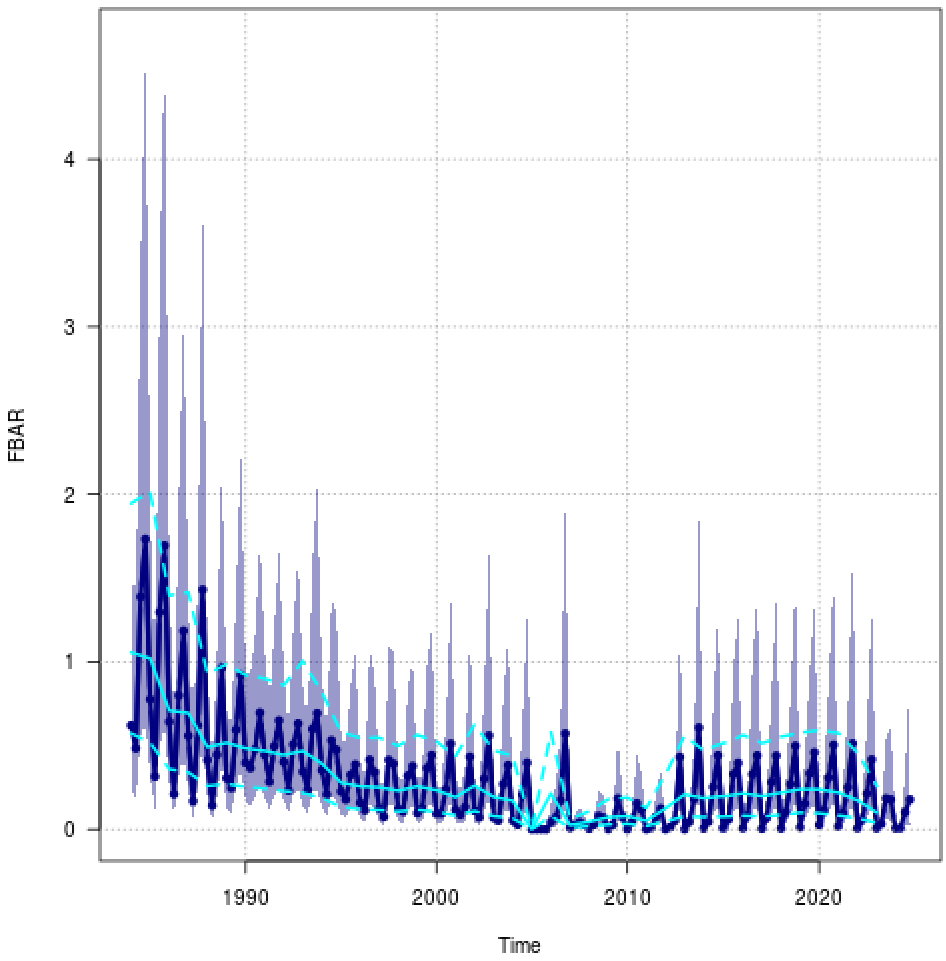

Figure 12.3.3. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: Fbar = F_{1-2}, quarterly. SESAM baseline run September 2024. Blue is quarterly values from SESAM, cyan is the yearly average from SESAM.

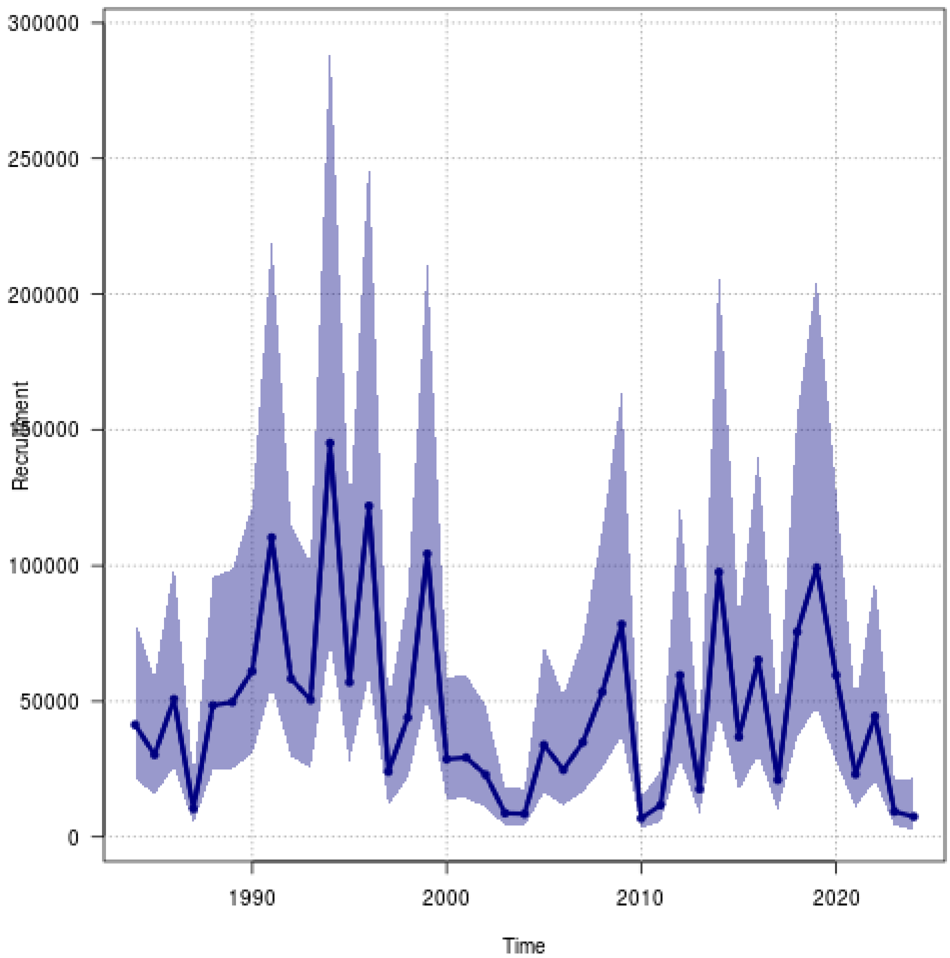

Figure 12.3.4. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: Recruitment (millions), yearly. SESAM baseline run September 2024. Blue is SESAM.

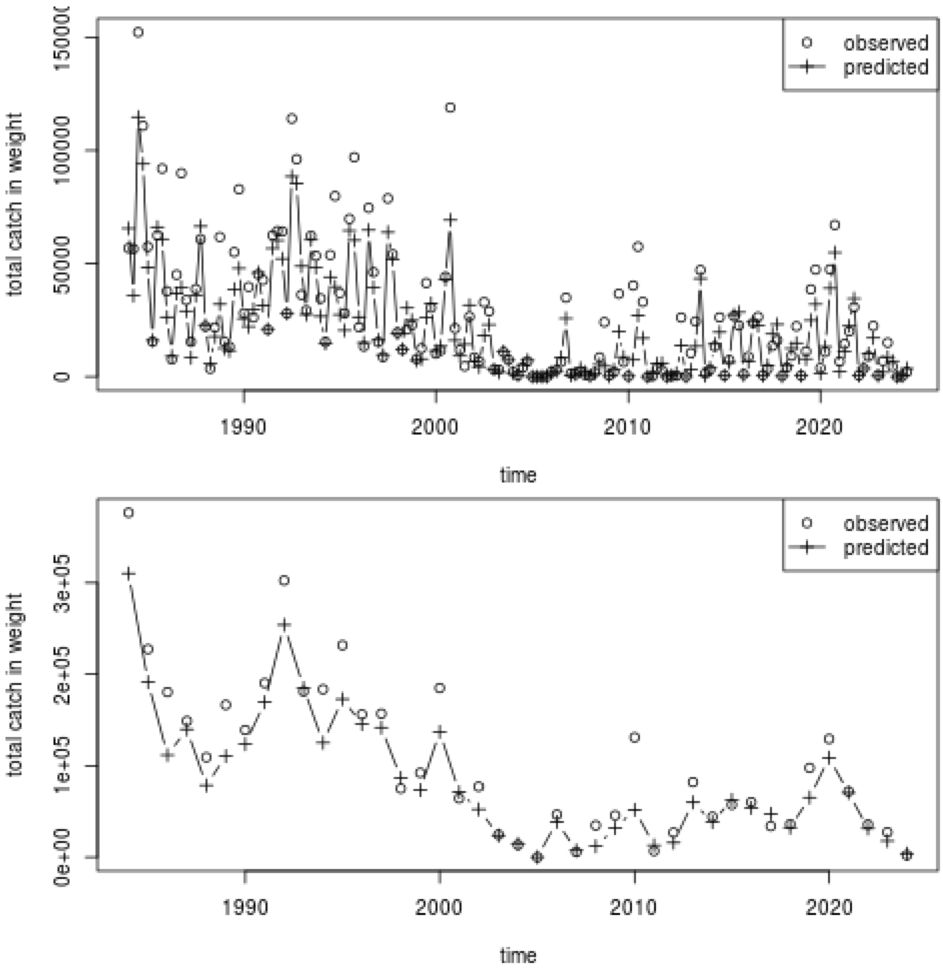

Figure 12.3.5. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: Yield = Total Catch (t), quarterly and yearly. SESAM baseline run September 2024.

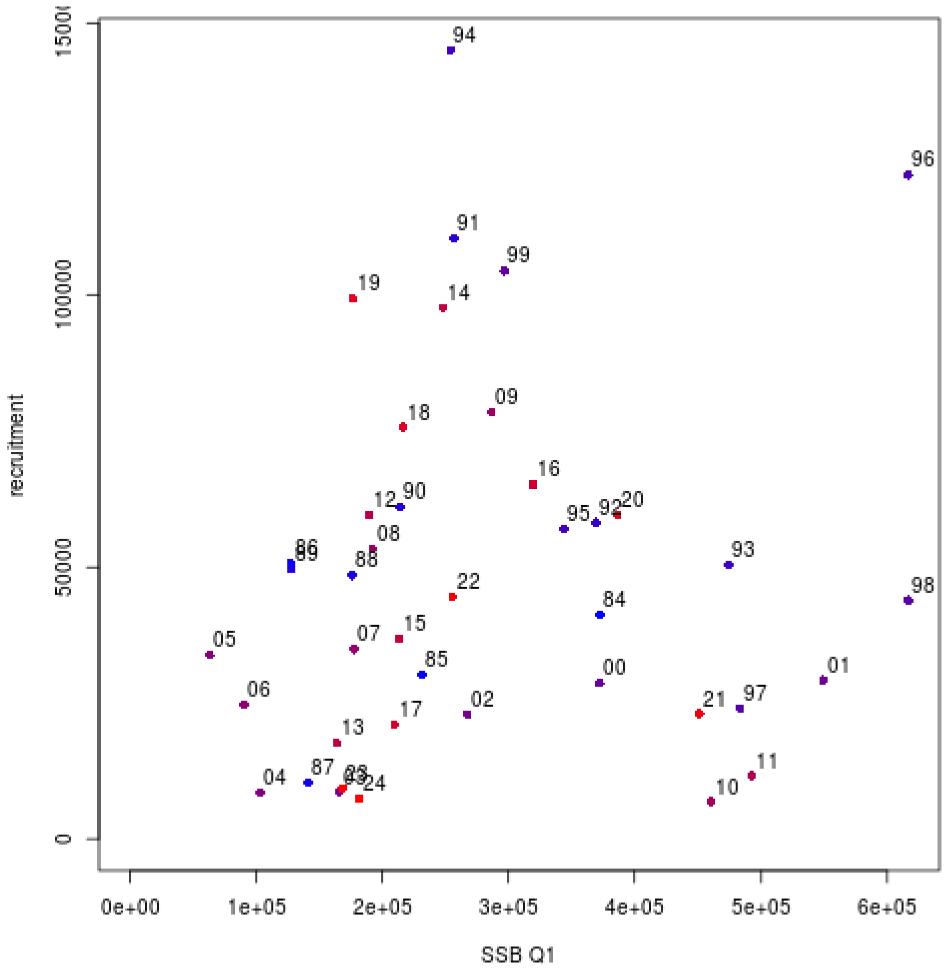

Figure 12.3.6. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: Stock (SSB) – Recruitment Plot Quarter 1. SESAM baseline run September 2024

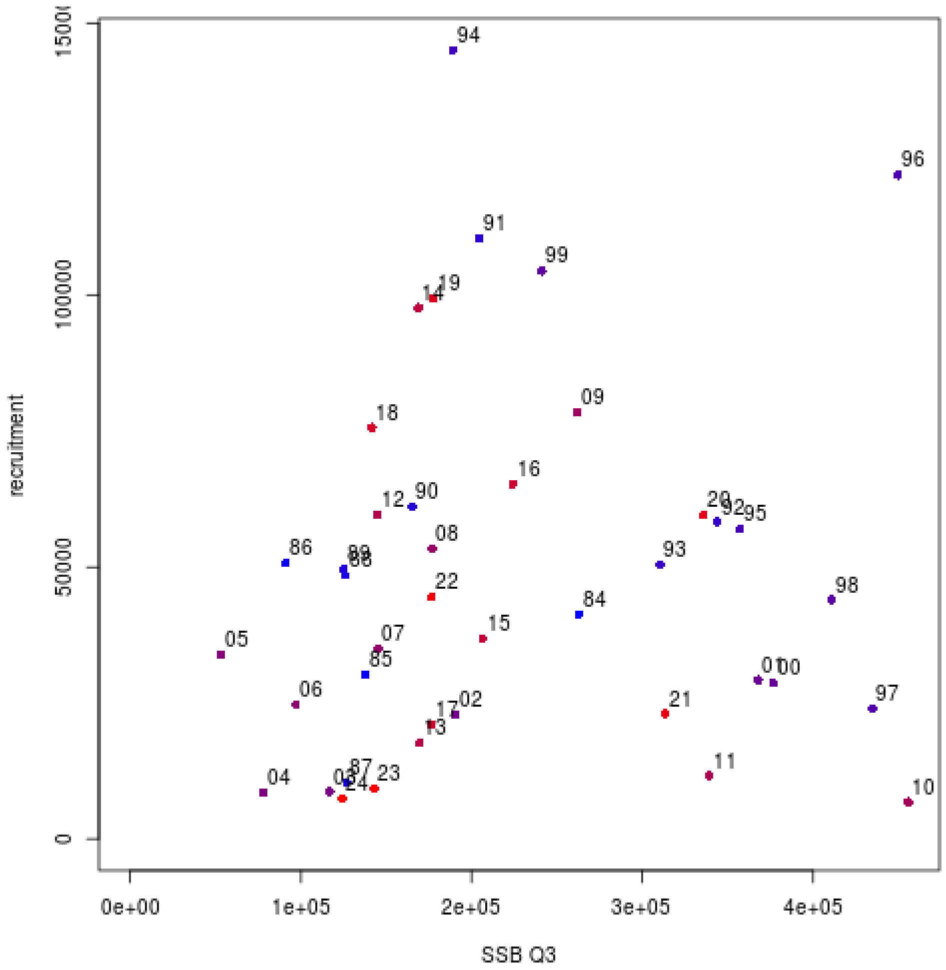

Figure 12.3.7. Norway pout in Subarea 4 and Division 3.a. Stock Summary Plots: Stock (SSB) – Recruitment Plot Quarter 3. SESAM baseline run September 2024.

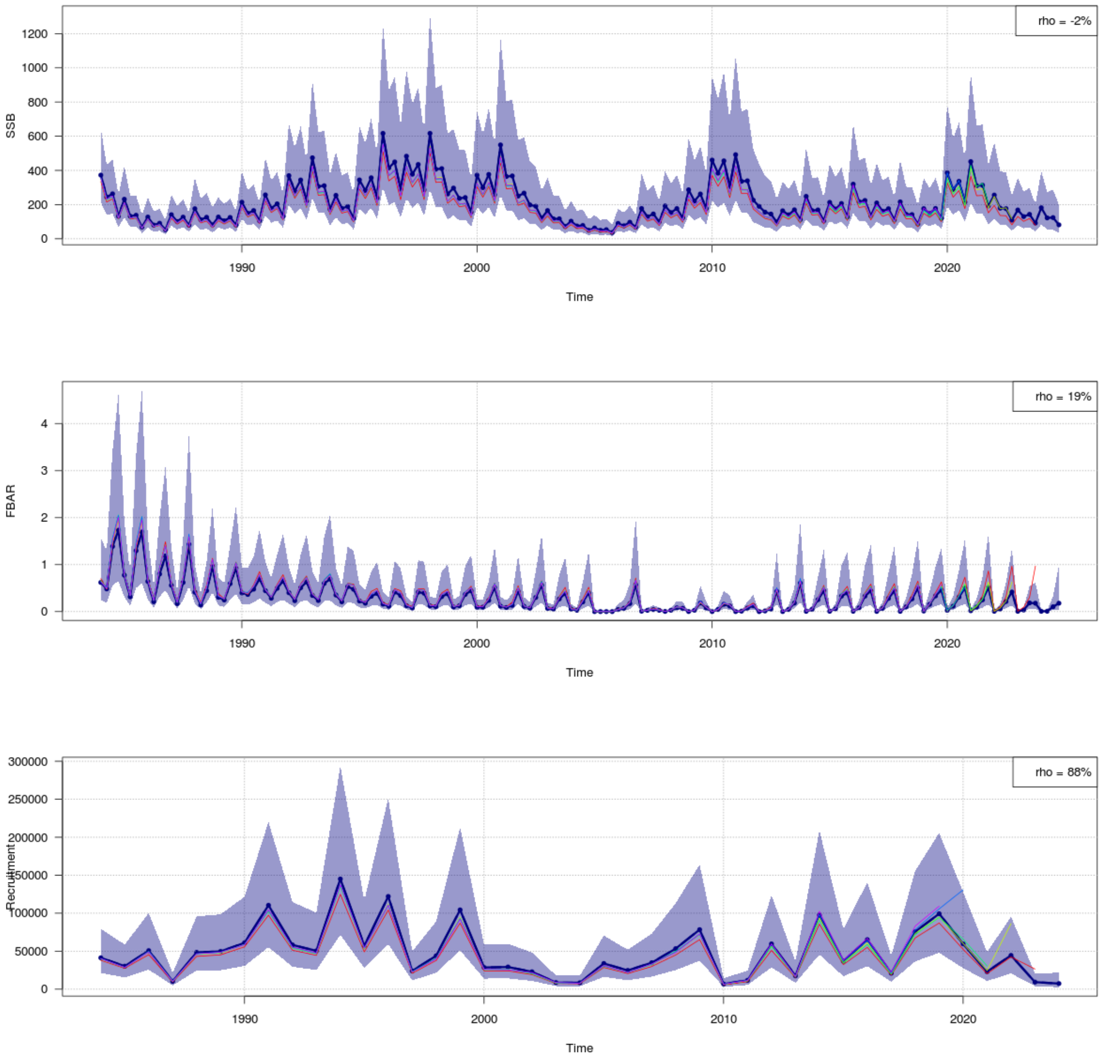

Figure 12.3.8. Norway pout in Subarea 4 and Division 3.a. Retrospective plots of baseline SESAM assessment September 2024, with terminal assessment year ranging from 2019–2024. Represent 5 year retrospective runs.

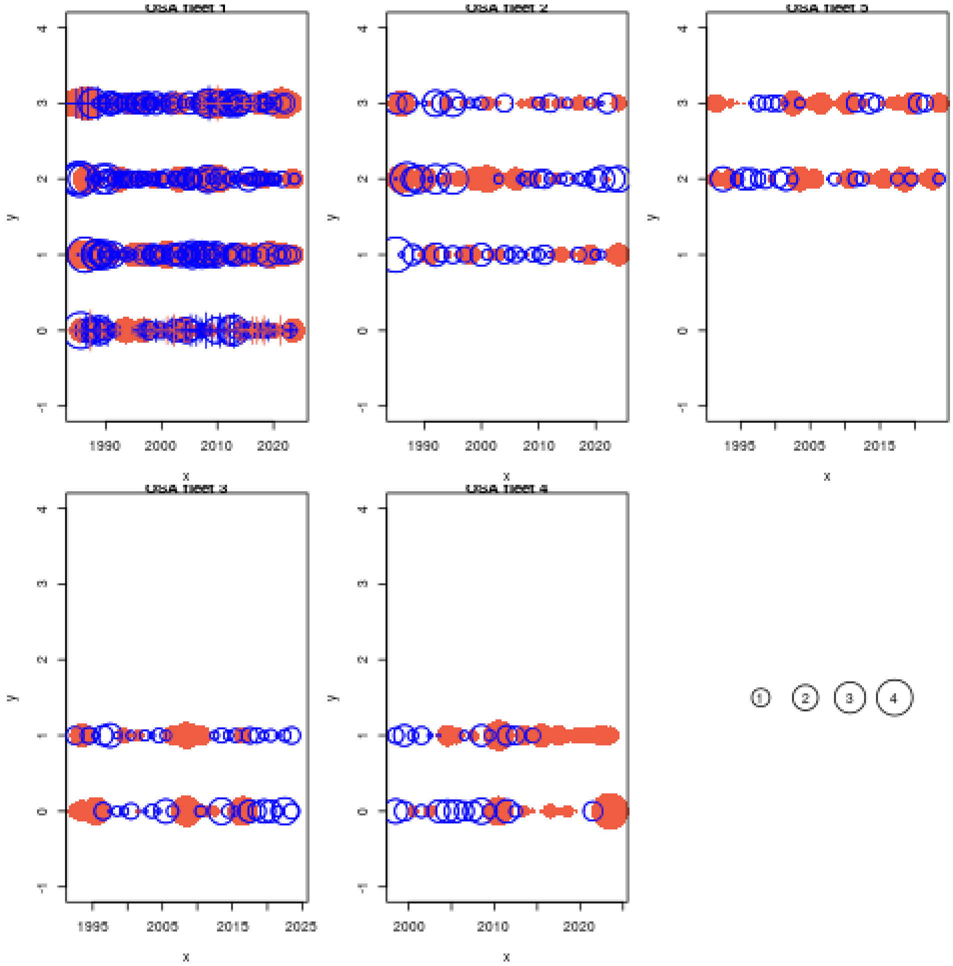

Figure 12.3.9. Norway pout in Subarea 4 and Division 3.a. Assessment Diagnostics Plots by fleet: One step ahead residuals (see Berg and Nielsen 2016). SESAM baseline run September 2024.

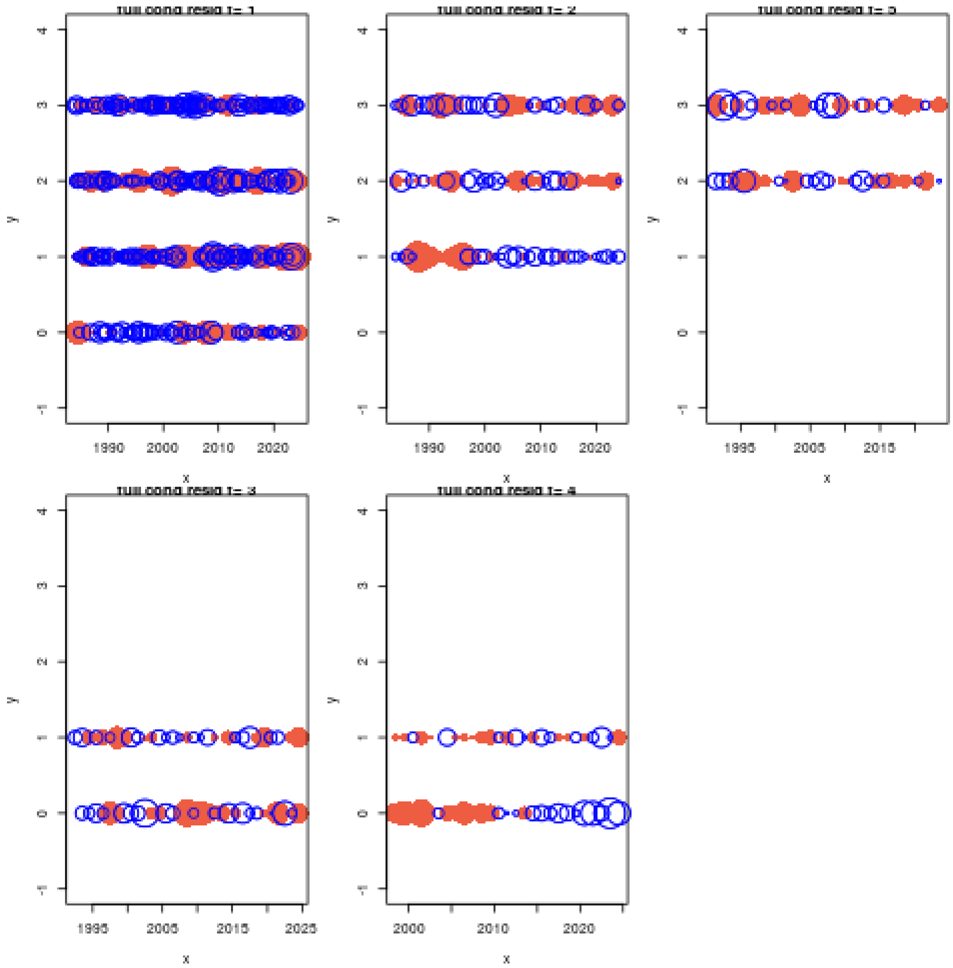

Figure 12.3.10. Norway pout in Subarea 4 and Division 3.a. Assessment Diagnostics Plots: Full conditional residuals or auxiliary residuals (see Berg and Nielsen 2016). SESAM baseline run September 2024.

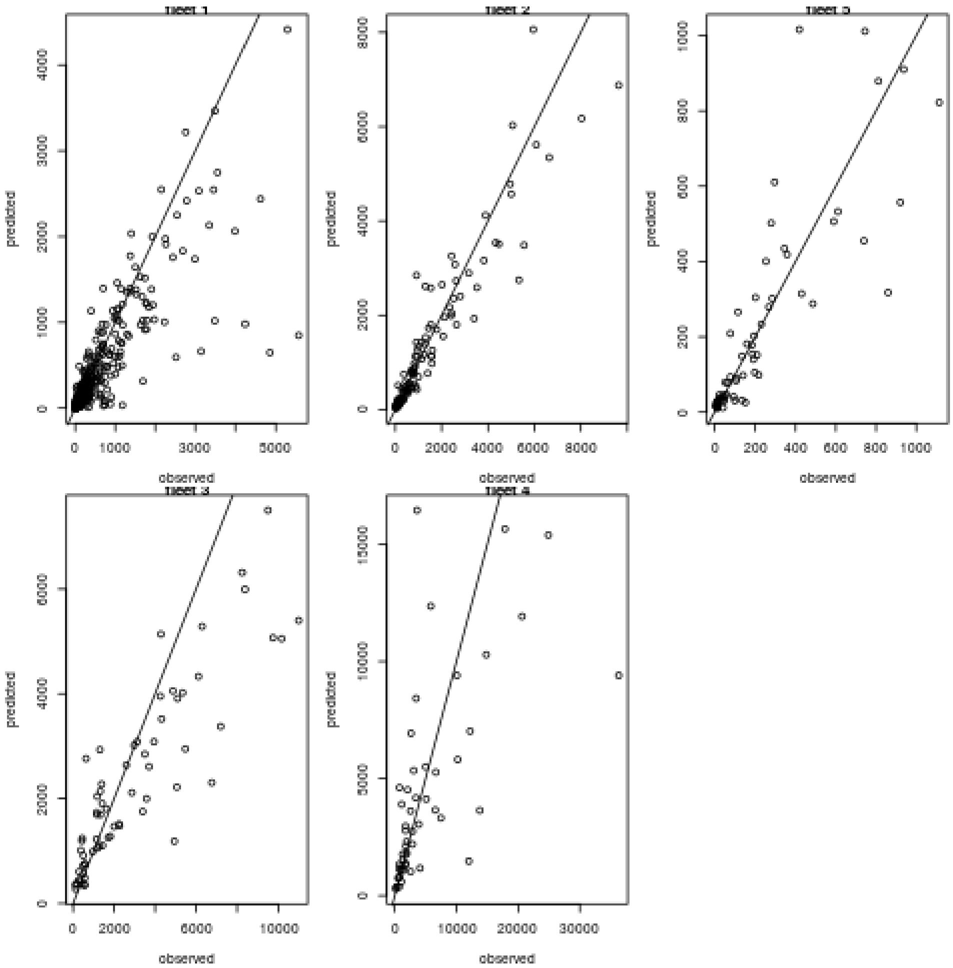

Figure 12.3.11. Norway pout in Subarea 4 and Division 3.a. Assessment Diagnostics Plots by fleet. SESAM baseline run September 2024.

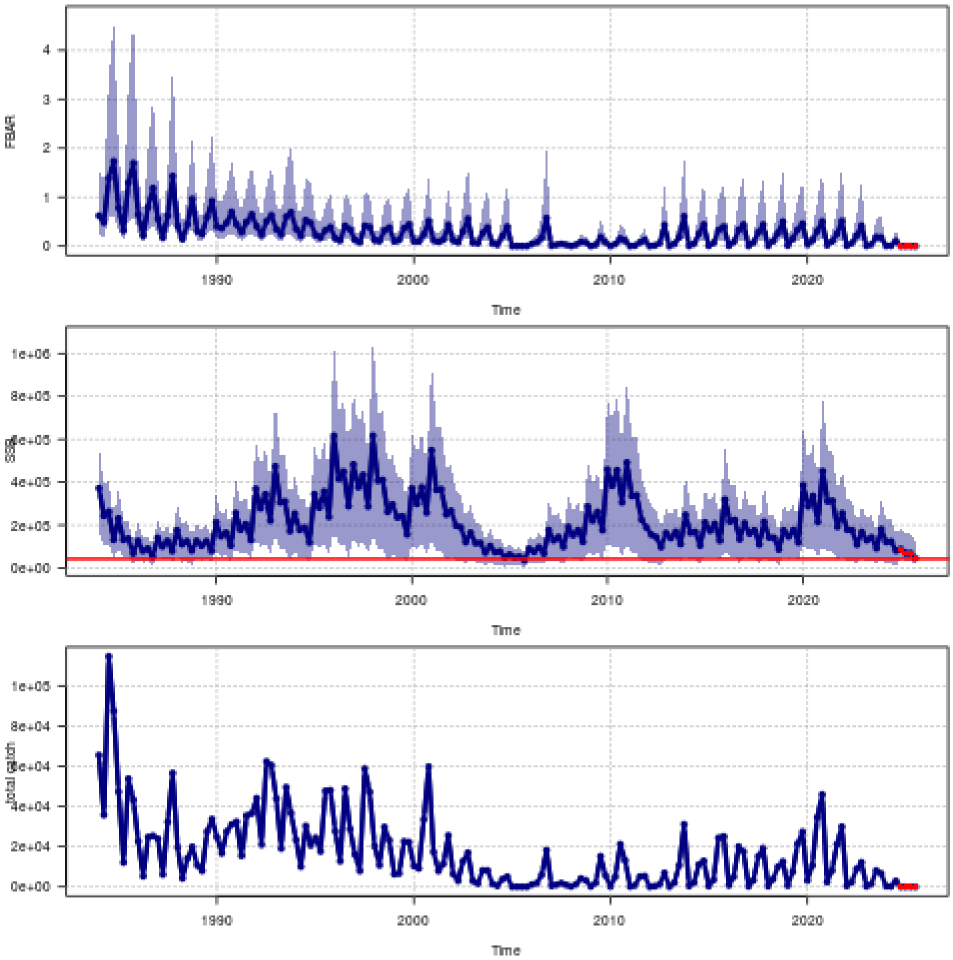

Figure 12.6.1. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that the fifth percentile of the SSB distribution one year ahead (1st October 2025) equals B_{lim}.

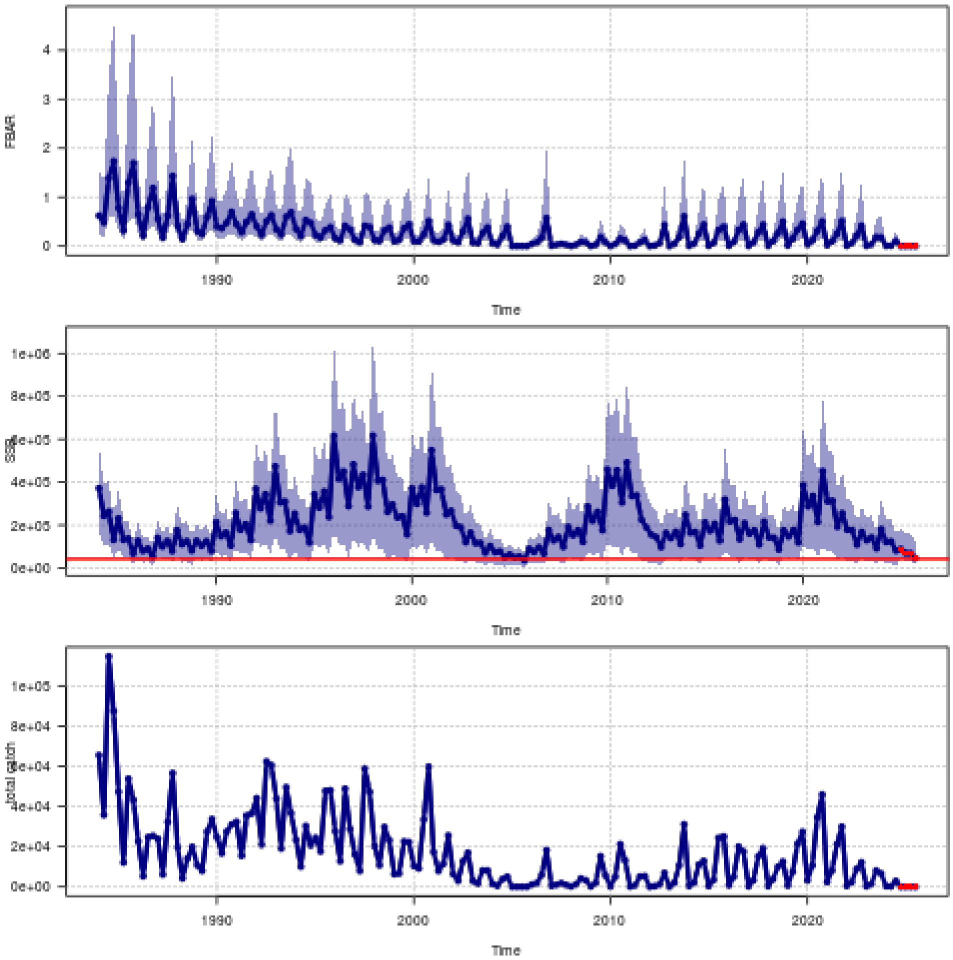

Figure 12.6.2. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to zero (no catch) for the period 1st October 2024 to 1st October 2025.

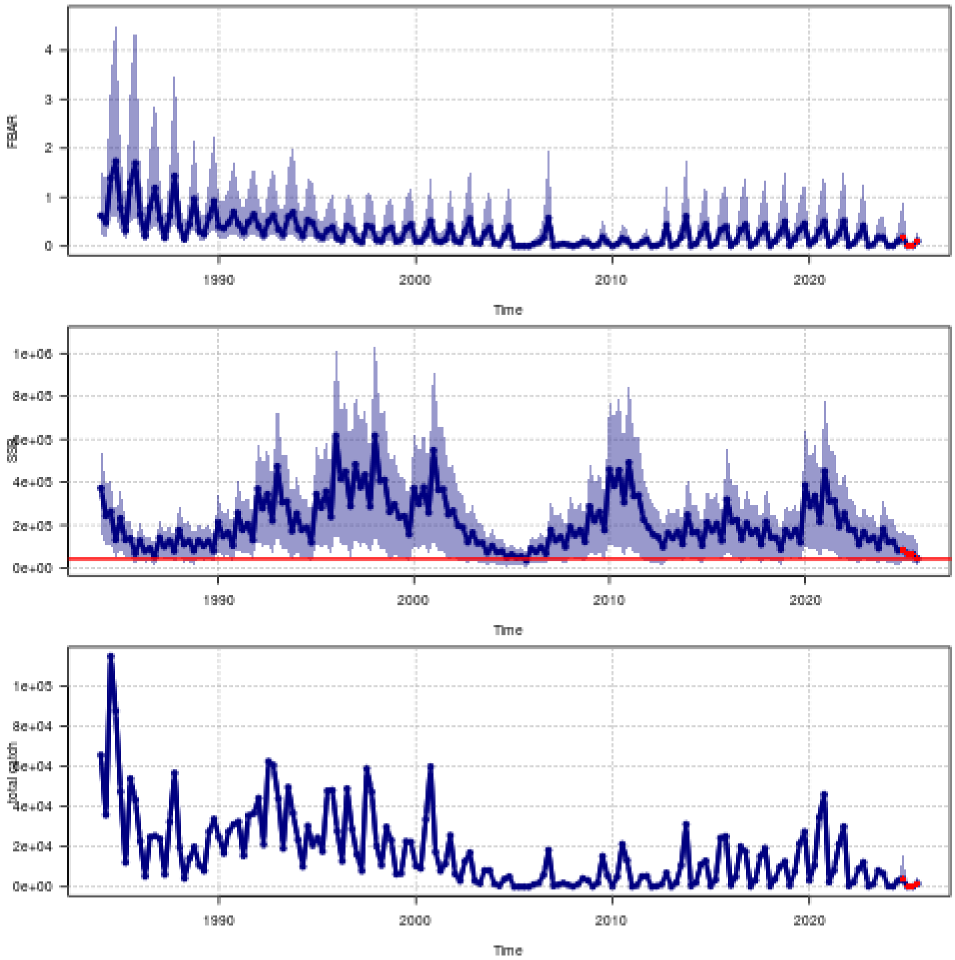

Figure 12.6.3. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to F status quo for the previous year to 1st October 2025.

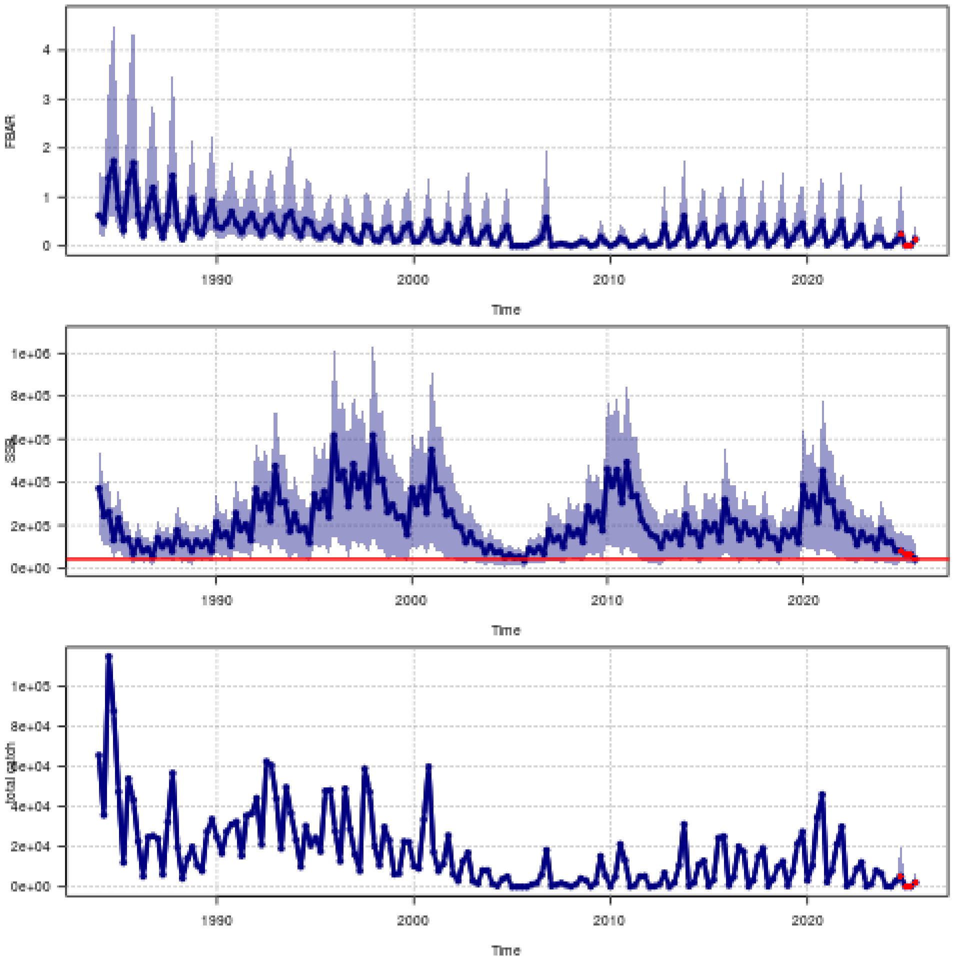

Figure 12.6.4. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that the median of the SSB distribution one year ahead (1st October 2025) equals B_{lim}.

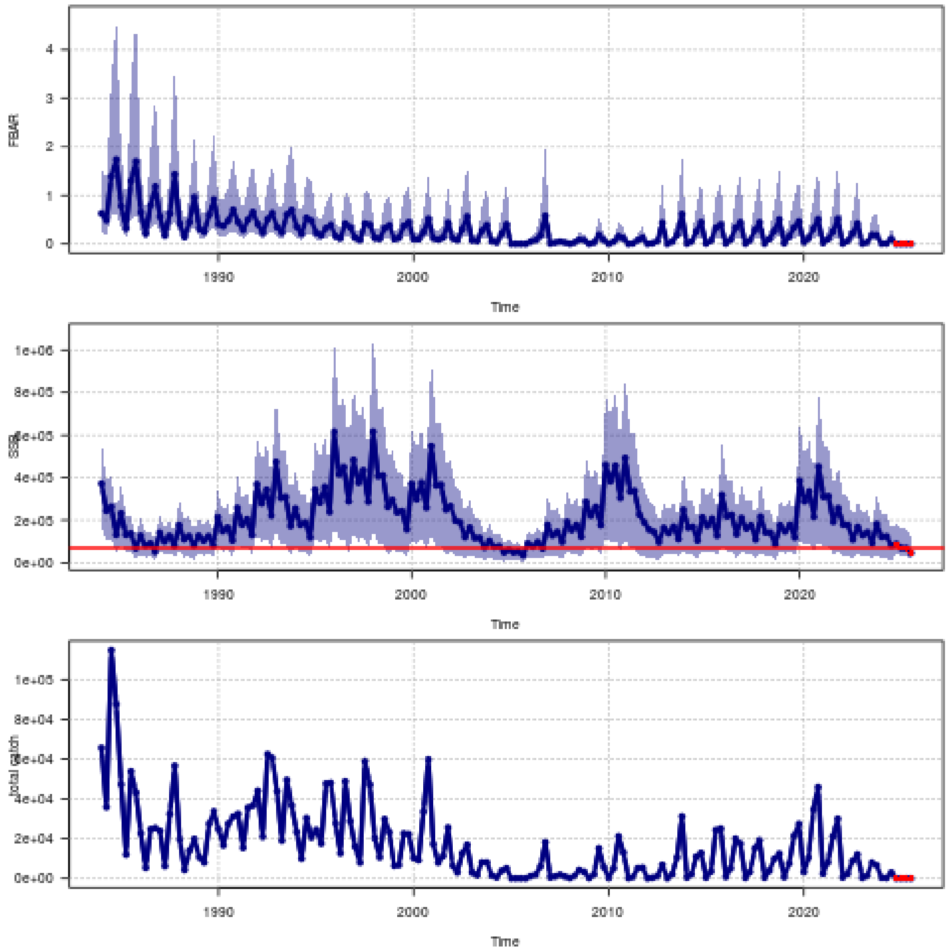

Figure 12.6.5. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled such that the SSB distribution one year ahead (1st October 2025) equals Bpa.

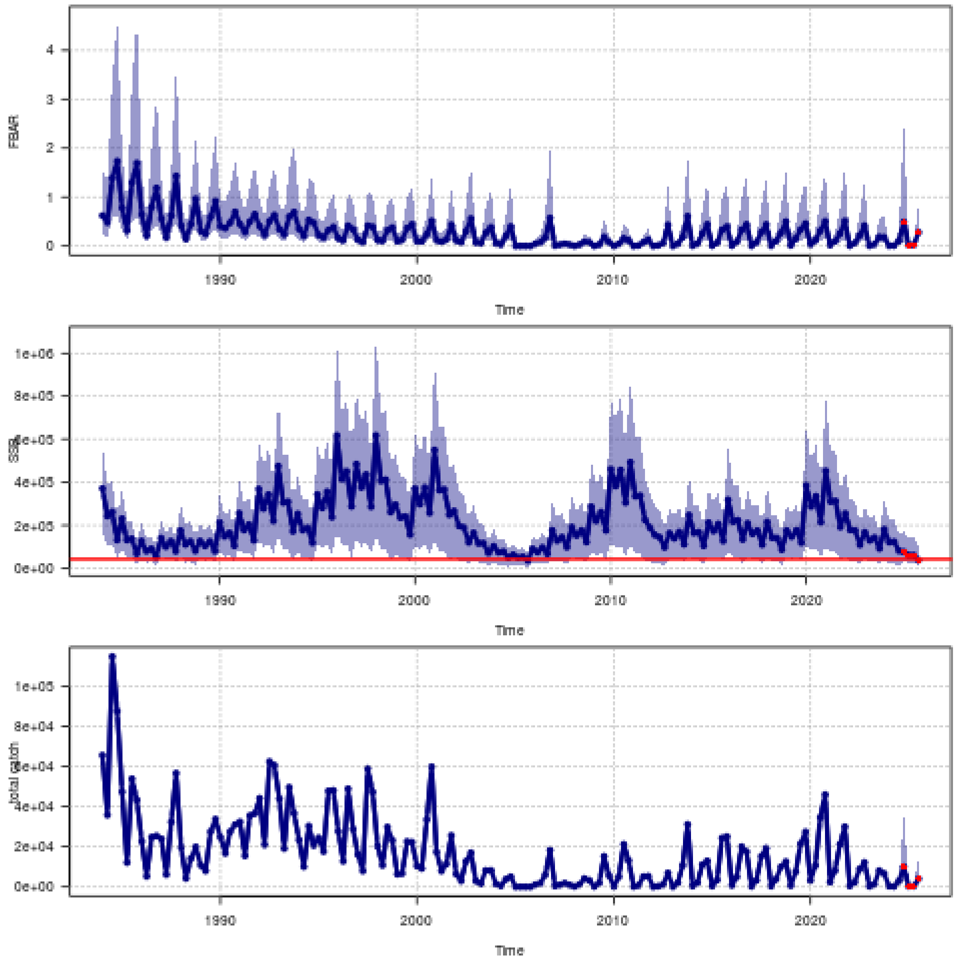

Figure 12.6.6. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.2 (F_{cap} = 0.2) for the period 1st October 2024 to 1st October 2025.

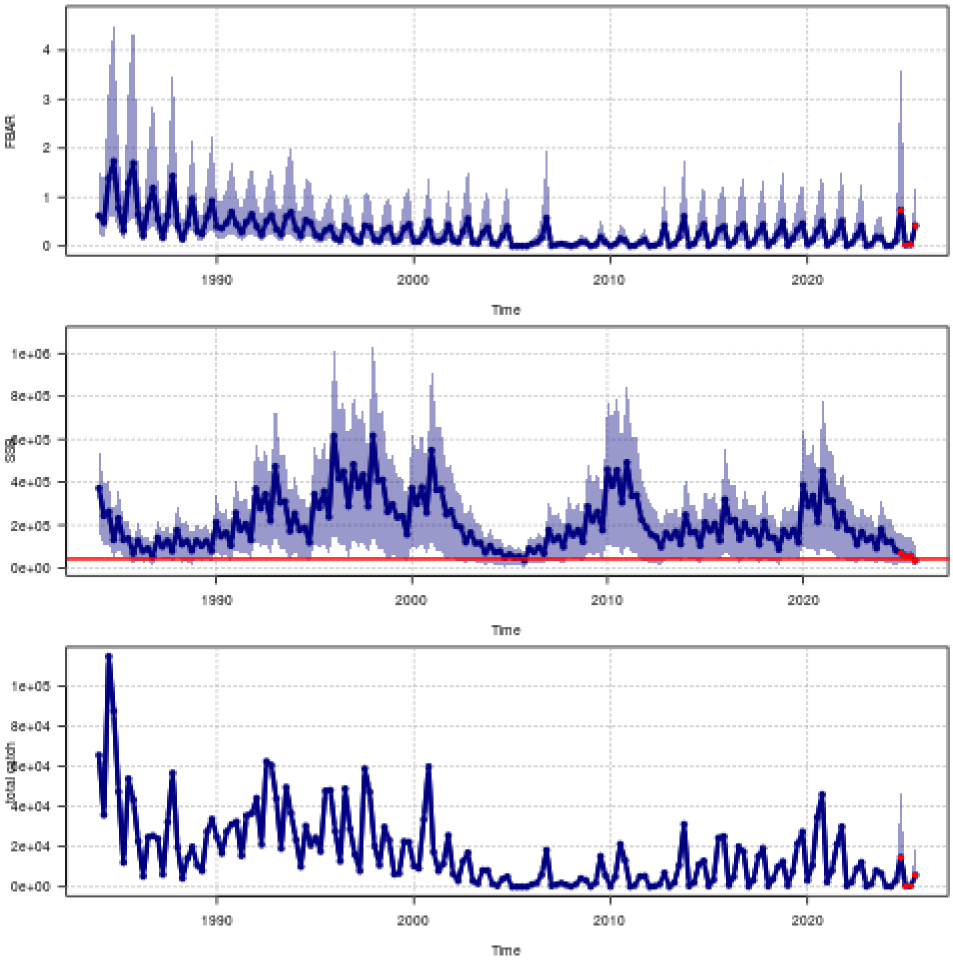

Figure 12.6.7. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.3 (F_{cap} = 0.3) for the period 1st October 2024 to 1st October 2025.

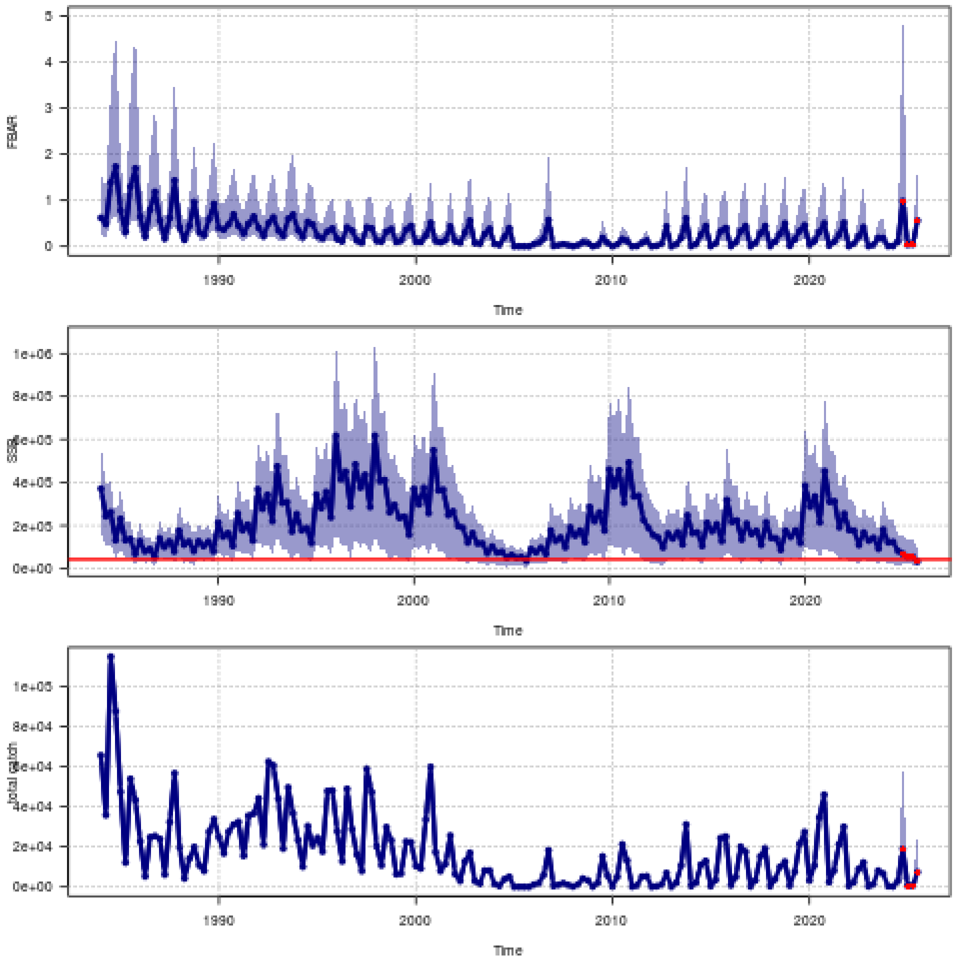

Figure 12.6.8. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.4 (F_{cap} = 0.4) for the period 1st October 2024 to 1st October 2025.

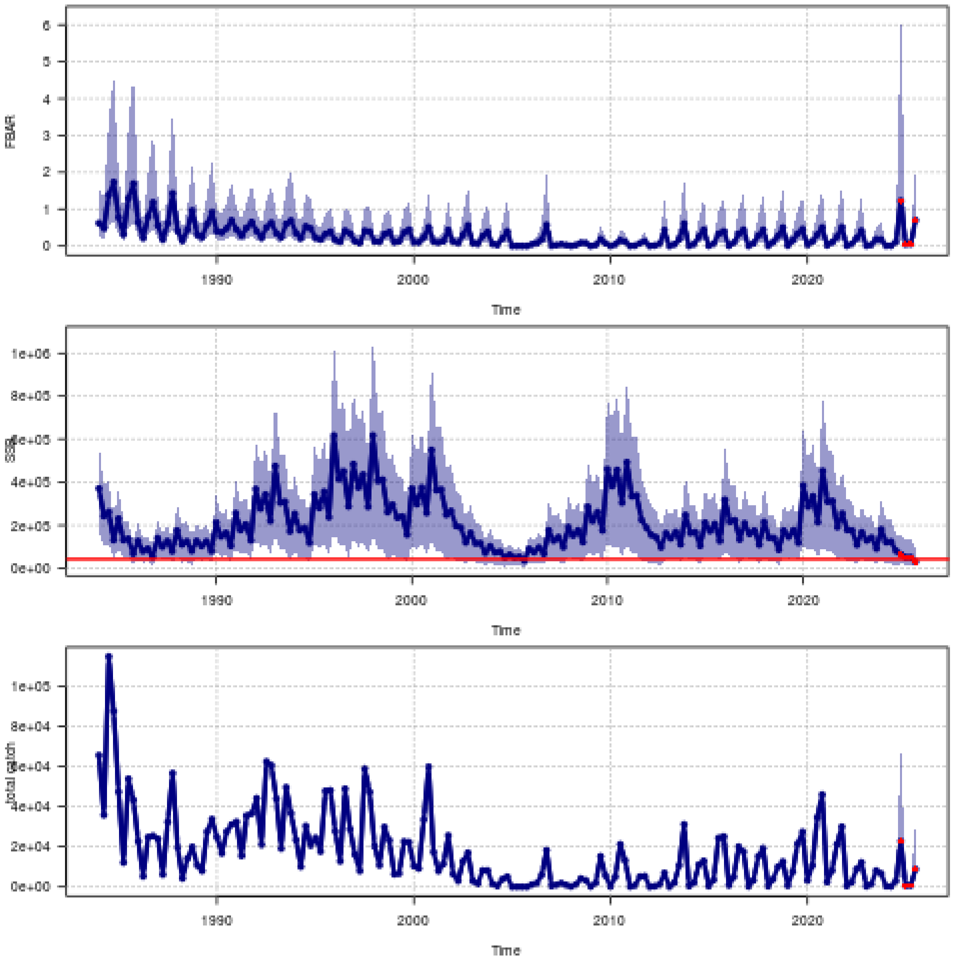

Figure 12.6.9. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.5 (F_{cap} = 0.5) for the period 1st October 2024 to 1st October 2025.

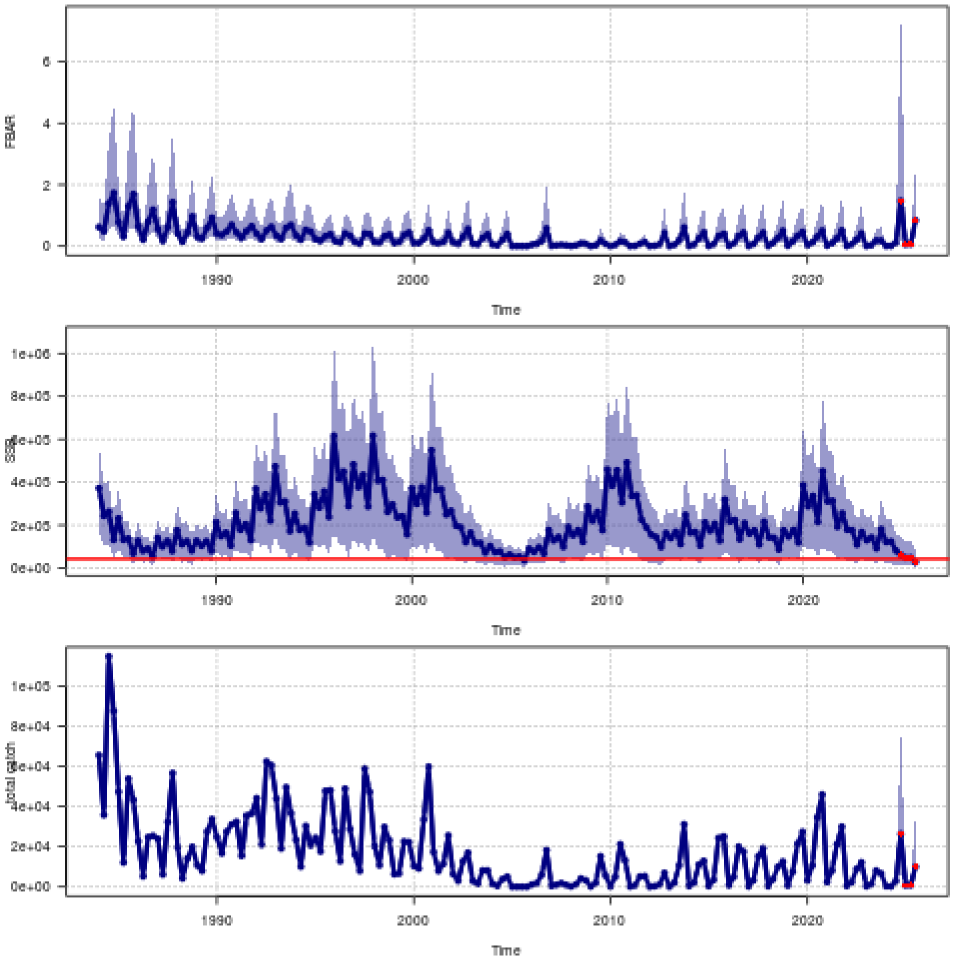

Figure 12.6.10. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.6 (F_{cap} = 0.6) for the period 1st October 2024 to 1st October 2025.

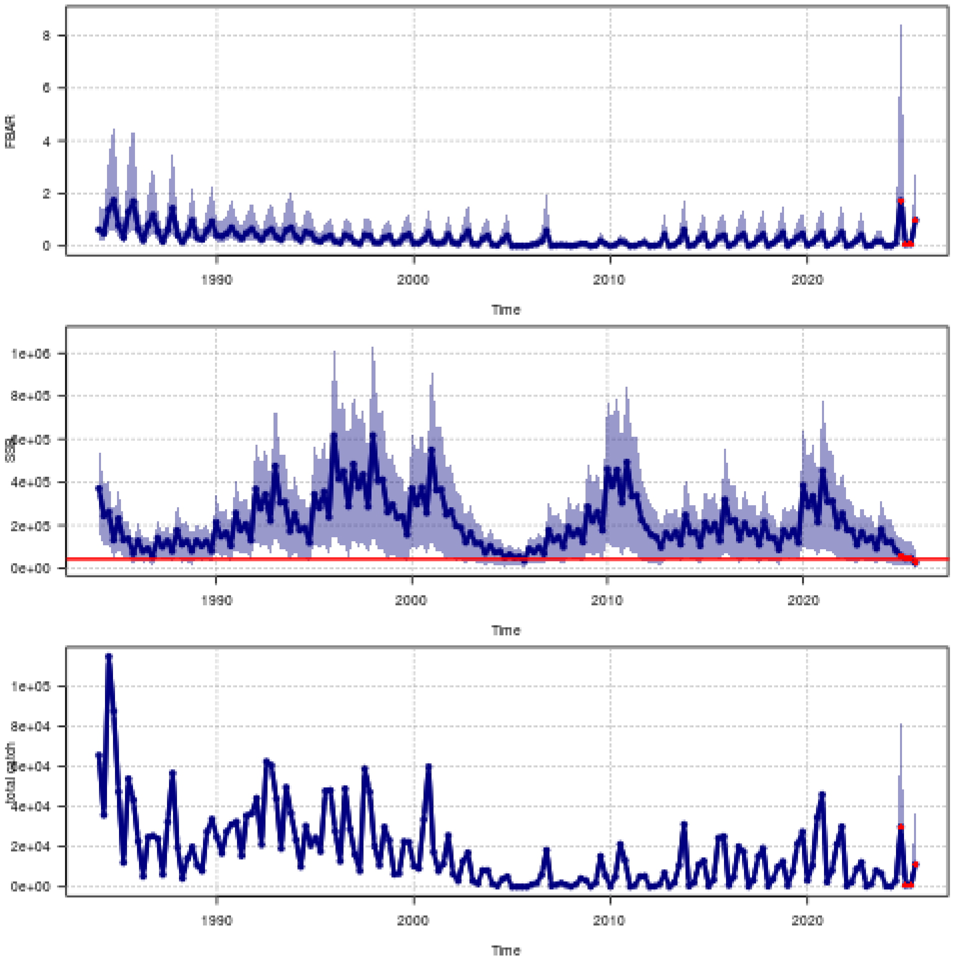

Figure 12.6.11. Norway pout in Subarea 4 and Division 3.a. Forecast of fishing mortality, SSB and median catch (t) with F scaled to 0.7 (F_{cap} = 0.7) for the period 1st October 2024 to 1st October 2025.

Contents