UK MSFD Article 8 Biodiversity Assessment Sheet (Full version) – HBDSEG 2017.

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| Sheet reference | UK\_HBDSEG\_BDC17/D4\_FW3\_SizeCompositionFish\_v1.0 |
| Indicator Title | Size composition in fish communities |
| Relevant Descriptor | D4 – Marine Food Webs |
| Relevant GES Criteria | D4.2 - Proportion of selected species at the top of food webs |
| Key message  (50 words) | The Typical Length of the demersal fish community has been adversely impacted by fishing and UK targets are unlikely to have been met in either UK North Sea or UK Celtic Seas despite recovery in some areas since 2010. In contrast, no change in the Typical Length of the pelagic fish community is evident. |
| Background (brief)  (250 words) | UK Target on Size composition in fish communities This indicator is used to assess progress against the following target, which is set in the UK Marine Strategy Part 1: *The size composition of fish communities should not be impacted by human activity such as to indicate any adverse change in trophic function within the community.*  ***Key pressures and impacts***  Over long periods of time, fishing leads to fish communities that are dominated by relatively small and young fish. Not only do fisheries preferentially select larger and older fish that tend to be prime breeders, but the simple reduction in biomass of a stock can lead to a truncation of the size-range present in the population. Under high fishing levels, the Typical Length of fish gradually declines as fish communities become dominated by smaller individuals that mature earlier and grow faster. When overfished, the transfer of mass and energy from prey species to larger predators (i.e. trophic function) is reduced. Therefore, trends in the Typical Length indicator will reflect a corresponding decline or improvement in trophic function of the foodweb.  ***Measures taken to address the impacts***  The UK Marine Strategy Part III states that all parts of the marine fish community have been impacted by human activities but there have been recent improvements in the status of some of these fish communities, primarily as a result of a reduction in fishing pressure. With existing policy in place and the introduction of the reformed Common Fisheries Policy it is expected that there will be a further reduction in overall fishing pressure reducing fishing impacts on both target and non-target species and sensitive species.  ***Monitoring, assessment and regional cooperation***  *Areas that have been assessed –* The assessment was based on data collected by 13 groundfish surveys carried out across two UK MSFD sub-regions - Greater North Sea and Celtic Seas. Results from the OSPAR assessment in adjacent waters are shown for comparison.  *Monitoring and assessment methods*  The Typical Length represents the average length of fish (bony fish and elasmobranchs) and provides information on the size composition within communities of fish that are composed of many species. The indicator is calculated using data on the length of fish caught by scientific surveys. Changes in typical length over time were estimated separately for demersal fish species that live on or near the sea floor and for pelagic species that live in the water column.  The lack of data prior to large scale commercial fishing, means it is difficult to determine what typical length values have been indicative of sustainable populations of demersal and pelagic fish. The time-series of data for most areas assessed, started in the 1980s or 1990s when fishing pressure had been high for a number of years. For the UK target to be met, typical length would be expected to be increasing compared to earlier points in the time-series. If typical length is not increasing, further investigation is required to identify if reductions in the size structure of communities is due to human activities, food web interactions or prevailing climatic conditions.  *Assessment thresholds*  No thresholds were set, but changes in typical length were categorised as ‘long-term decrease to a minimum state’, ‘long-term decrease’ (i.e. typical length in the current period is lower than in an earlier period, but higher than a more recent one), ‘long-term increase’ or ‘no change’. The periods were identified using statistical analyses (see Trend Analysis in Assessment Method (extended)). Additionally, in each case the minimum value observed over the time-series, prior to the last 6 years, was considered as a lower limit that should be avoided in future.  *Regional cooperation*  The UK has been the joint indicator lead in OSPAR and the UK results are being used in the OSPAR Intermediate Assessment 2017. |
| Background (extended) No word limit | Justification for the indicator  The distribution of biomass over body sizes (size spectra; Kerr and Dickie, 2001) is an emergent property of food webs, therefore size-based metrics that are sensitive and specific to pressures can be used as indicators of food web structure. Jennings et al. (2007) found that body size was related to trophic level in fish in the North Sea at the community level (see also Reum et al., 2015). Barnes et al. (2010) demonstrated the relationship between fish size and trophic transfer efficiency. Riede et al. (2011) demonstrated that log-mean body size was significantly related to trophic level in marine invertebrates, ectotherm and endotherm vertebrates using data on multiple ecosystems. Model simulations (Rossberg et al., 2008) have demonstrated that in foodwebs, where trophic interactions dominate over other interactions, large species at high trophic levels are highly sensitive to loss of diversity at lower trophic levels (ICES, 2014a).  Fishing is a size-selective process therefore the body size of fish decreases during overexploitation (Boudreau and Dickie, 1992). A gradual, steady decline in Typical Length is expected in response to high fishing pressure because the size structure of the community integrates the impacts of fishing pressure over long periods of time (Rossberg, 2012; Fung et al., 2013). Processes related to increases in sea temperature also serve to reduce body size of fish (Daufresne et al., 2009; Gibert and DeLong, 2014). The indicator can respond to pressures on the marine environment that impact individual fish directly (entrapment activities) or indirectly (through change in their seabed or pelagic habitat, primary production and food web interactions). Although species are combined within the habitat-based feeding assemblages, it is possible to compute the indicator for each species individually.  References  Barnes et al. (2010) Global patterns in predator–prey size relationships reveal size dependency of trophic transfer efficiency Ecology, 91(1), 222–232  Boudreau P. R., L. M. Dickie (1992) Biomass Spectra of Aquatic Ecosystems in Relation to Fisheries Yield. Canadian Journal of Fisheries and Aquatic Sciences, 1992, 49:1528-1538, 10.1139/f92-169  Daufresne M., Lengfellner K. and Sommer U. (2009) Global warming benefits the small in aquatic ecosystems PNAS 106 (31) 12788-12793, doi:10.1073/pnas.0902080106  Fung, T., Farnsworth, K. D., Shephard, S., Reid, D. G., and Rossberg, A. G. 2013. Why the size structure of marine communities can require decades to recover from fishing. Marine Ecology Progress Series, 484, 155—171. doi:10.3354/meps10305.  Gibert JP, DeLong JP. 2014 Temperature alters food web body-size structure. Biol. Lett. 10: 20140473. http://dx.doi.org/10.1098/rsbl.2014.0473  ICES, 2014a - Report of the Working Group on the Ecosystem Effects of Fishing Activities (WGECO). ICES Document CM 2014/ACOM:26, Copenhagen, Section 3.4.3 (http://tinyurl.com/p8vwu7d)  Jennings, S., Oliveira, J. A. A. D. and Warr, K. J. (2007), Measurement of body size and abundance in tests of macroecological and food web theory. Journal of Animal Ecology, 76: 72–82. doi:10.1111/j.1365-2656.2006.01180.x  Kerr, S. R. & Dickie, L. M. 2001. The biomass spectrum: a predator– prey theory of aquatic production. New York, NY:Columbia University Press.  Reum, J. C. P., Jennings, S. and Hunsicker, M. E. (2015), Implications of scaled δ15N fractionation for community predator–prey body mass ratio estimates in size-structured food webs. J Anim Ecol, 84: 1618–1627. doi:10.1111/1365-2656.12405  Riede, J. O., Brose, U., Ebenman, B., Jacob, U., Thompson, R., Townsend, C. R. and Jonsson, T. (2011), Stepping in Elton’s footprints: a general scaling model for body masses and trophic levels across ecosystems. Ecology Letters, 14: 169–178. doi:10.1111/j.1461-0248.2010.01568.x  Rossberg, A. G., Ishii, R., Amemiya, T. and Itoh, K. (2008). The top-down mechanism for body-mass–abundance scaling. Ecology, 89: 567–580. doi:10.1890/07-0124.1  Rossberg, A. G. (2012). A complete analytic theory for structure and dynamics of populations and communities spanning wide ranges in body size. Advances in Ecological Research, 46, 429-522 |
| Background (figures & tables) | *org2:Major Activities:IntermediateAssessment_2017:04_Indicator_Assessment_Sheets:03 Draft Assessment Sheets:03_BDC:21_D4_FW3_Size_composition_fish_communities:01_Figures:Alupus.jpeg* A large bodied Atlantic wolffish anarhichas lupus (Credit: Jim Ellis) |
| Assessment Method (extended) No word limit | Indicator Metric  The Typical Length (TyL) metric is the weighted geometric mean length of fish in units of centimetres (cm), with weights given by the standardised catch rate of individuals in an area and defined as follows:  *Formula a. The typical Length metric*  where *Mi* is the body mass (standardised to kg per unit area fished) of the *i*-th fish with length *Li* (cm) in a sample of *N* fish.  Data for this indicator come from scientific fisheries surveys, which ideally sample the entire fish community but in practice do not. The indicator requires that surveys are conducted at regular intervals (e.g. annually) in the same area with a standard fishing gear. Sufficiency of available sample sizes can be judged using re-sampling techniques (Shephard et al., 2012). The absolute biomass of individuals in length classes present in the environment is not recorded directly by surveys, rather observations are made from samples with detection error (including many false negatives). The detection error is further complicated by differing catchabilities over length classes and species such that the relative abundance between species and length classes observed is survey specific. Where available, catchability estimates can be used to attempt to correct for this component of the systematic measurement error (e.g. Fraser et al., 2007). However, such estimates are sparse in the scientific literature and prone to great uncertainty. In future, the recent catchability corrections estimated by Walker et al. (2017) could be considered. Alternatively, model-based estimates of absolute species abundance can be used to rescale observed abundances, but here model uncertainty is also great (ICES, 2014b). For simplicity, Typical Length is measured without correction for detection error and with a varying limitation by species to the size range sampled by fishing gear. For each survey, this indicator is calculated for subdivisions of each MSFD sub-region that represent different habitats and communities, where possible.  The data are collected under the national programmes and the Data Collection Framework (EC, 665/2008). Currently, the most important data source for Typical Length are those groundfish surveys that are conducted as part of ICES. The International Bottom Trawl Survey (IBTS) programme in the North Sea, the Celtic Seas, Bay of Biscay and Iberia is particularly important since the trawl is a general-purpose design aimed to catch both demersal and pelagic species. However, beam trawl surveys are more efficient at catching benthivorous species (such as sole) and acoustic surveys, supplemented with pelagic trawling, are more suitable for pelagic species (such as mackerel) and time-series of Typical Length from such surveys may be preferable should sufficient length sampling of fish be made.  Data used and quality assurance  The assessment relies on raw data from the ICES database of groundfish surveys (DATRAS, [www.ices.dk/marine-data/data-portals/Pages/DATRAS.aspx](http://www.ices.dk/marine-data/data-portals/Pages/DATRAS.aspx)). These data have been quality controlled by OSPAR as part of this assessment process to generate a data product for assessment purposes. Time-series of Typical Length for fish and elasmobranchs were derived from each available groundfish survey, where the community was separated into demersal and pelagic habitat-based feeding assemblages.  Time-series of Typical Length by assemblage were determined for 13 surveys that sample within UK waters and are carried out in the Greater North Sea and Celtic Seas (Table a). Ecological sub-divisions were determined for the North Sea using a simplification of those strata proposed by the EU financed project “Towards a Joint Monitoring Programme for the North Sea and Celtic Sea (JMP NS/CS) that took place 2013 and building upon work in the EU project VECTORS (Vectors of change in European Marine Ecosystems and their Environmental and Socio-Economic Impacts) that examined the significant changes taking place in European seas, their causes, and the impacts they will have on society. In the Celtic Seas, the strata used in the design of each survey were considered appropriate to represent the ecological sub-divisions.  Standard data collected on these surveys consists of numbers of each species of fish sampled in each sample, measured to defined length categories (i.e. 1cm below, so a fish with a recorded length of 14 cm would be between 14.00 cm and 14.99 cm in length). By dividing these species catch numbers-at-length by the area swept by the trawl on each sampling occasion, these catch data are converted to standardised estimates of fish density-at-length, by species, at each sampling location. However, the indicator is based on biomass rather than abundance, so these abundance densities were converted to biomass density data through the application of species weight (w) at length relationships (of the form w = aLb, where a and b are species-specific parameters). Density estimates per length category per species based on biomass (kg per km2) are referred to below as Catch Per Unit Area (CPUA).  These trawl-sample density-at-length estimates were averaged (retaining year, species and length category information) across all trawl samples within each sampling stratum (i.e. survey specific strata following the survey design, which is a rectangular grid in the North Sea and generally depth-based strata elsewhere).   |  |  |  | | --- | --- | --- | | Subregion | Survey Accronym1 | Survey Period | | Celtic Seas  (including OSPAR Wider Atlantic) | CSFraOT42 | 1997 – 2015 | | CSEngBT3 | 1993 – 2015 | | CSIreOT4 | 2003 – 2015 | | CSNIrOT1 | 1992 – 2015 | | CSNIrOT4 | 1992 – 2015 | | CSScoOT1 | 1985 – 2016 | | CSScoOT4 | 1995 – 2015 | | WAScoOT3 | 1999 – 2015 | | Greater North Sea | GNSEngBT3 | 1990 – 2015 | | GNSFraOT4 | 1988 – 2015 | | GNSIntOT1 | 1983 – 2016 | | GNSIntOT3 | 1998 – 2016 | | GNSNetBT3 | 1999 – 2015 |   Table a: List of groundfish surveys, region in which they operate, and the period over which they have been undertaken.  1. Survey acronym convention: First 2 to 4 Capitalised letters indicate the MSFD subregion (BBIC – Bay of Biscay and Iberian Coast; CS – Celtic Seas; GNS – Greater North Sea; WA – Wider Atlantic). Next Capitalised and lower case letters signify the country involved (Fra – France; Eng – England; Ire – Republic of Ireland; NIr – Northern Ireland; Sco – Scotland; Ger – Germany; Net – The Netherlands; Int – International. International refers to the two international groundfish surveys carried out in the North Sea under the auspices of ICES. Next two capitalised letters indicate the type of survey (OT – Otter trawl; BT – Beam trawl). Final number indicates the season in which the survey is primarily undertaken (1 – January to March; 3 – July to September; 4 – October to December).  2. This is a single survey that operates across both the Celtic Seas and the Bay of Biscay subregions, from the southern coast of the Republic of Ireland and down the western Atlantic coast of France. For indicator assessment purposes this single survey was split into its two subregional components  **Trend analysis**  The indicator is aggregated at the survey level within each region assessed and complemented by sub-divisional analyses at a scale appropriate to pressures and habitats that can be highly localised. Sub-divisional metrics are aggregated through a weighted average where those weights are given by the total surveyed biomass of relevant assemblage in each sub-division. The long-term trend in each time-series (sub-division and survey level) was modelled through the application of a LOESS smoother (i.e. locally weighted scatterplot smoothing) with a “fixed span” of one decade and Breakpoints analyses were used to define stable underlying periods.  At both sub-divisional level and survey level, breakpoints analyses were used to define stable underlying periods (see Probst and Stelzenmüller, 2015). The method allows us to say whether there is a significant change in the time series state over time i.e. whether the recent period is not significantly different from the historically observed period (as shown in the section Results extended). The method avoids the arbitrary choice of reference periods for assessment (i.e. how many years do use to calculate an average) which can lead to subjective assessments. The shorter the period chosen the more likely we are to be comparing noise in the data or natural fluctuations in the system against each other. However, too long a period and we might average out actual changes in state. The minimum detectable period is defined in this analysis as 3 years. The analysis uses two statistical approaches: First apply ‘supremum F test’ to identify if non-stationary time series or if a constant period for the entire time series is more suitable. If considered non-stationary, then breakpoints analysis finds periods of at least 3 years duration. Changes in typical length between the underlying periods were categorised as ‘long-term decrease to a minimum state’ (the most recent period is lower than all previous periods), ‘long-term decrease’ (i.e. typical length in the current period is lower than the earliest period but higher than a more recent one), ‘long-term increase’ (the most recent period is higher than all previous periods) or ‘no change’ (no significant change in underlying state identified).  *References*  Fraser, H. M., Greenstreet, S. P. R., and Piet, G. J. 2007. Taking account of catchability in groundfish survey trawls: implications for estimating demersal fish biomass. ICES Journal of Marine Science, 64: 1800–1819  ICES. 2014b. Interim Report of the Working Group on Multispecies Assessment Methods (WGSAM), 20–24 October 2014, London, UK. ICES CM 2014/SSGSUE:11  Probst WN, Stelzenmüller V (2015) A benchmarking and assessment framework to operationalise ecological indicators based on time series analysis. Ecological Indicators 55: 94-106, doi:10.1016/j.ecolind.2015.02.035  Shephard, S., Fung, T., Houle, J. E., Farnsworth, K. D., Reid, D. G., and Rossberg, A. G. 2012. Size-selective fishing drives species composition in the Celtic Sea. ICES Journal of Marine Science, 69: 223–234 Walker, N. D., Maxwell, D. L., Le Quesne, W. J. F., and Jennings, S. (2017) Estimating efficiency of survey and commercial trawl gears from comparisons of catch-ratios. ICES Journal of Marine Science, doi:10.1093/icesjms/fsw250 |
| Results (brief)  (450 words) | Results and progress towards achieving the relevant UK target *Findings from the 2012 UK Initial Assessment*  This indicator was not considered as part of the 2012 Initial Assessment.  *Latest findings*  *Status assessment*  Not applicable: this assessment is based on a trend and not on a comparison with a threshold value.  *Trend assessment*  Greater North Sea  Overall the typical length of the assessed demersal fish community is low compared to the early 1980s (Figures 1 and 2). Areas of concern, with long term decreases to lowest observed levels remain in the western and southern North Sea (Figure 1). Nevertheless, the demersal fish community at the Greater North Sea scale is recovering due to recent increases in typical length in some subdivisions with a high biomass of fish (Figure 1, left): including the Orkney/Shetland area in the northern North Sea and UK coast in the Channel.  The pelagic fish community generally shows fluctuations without trend in the UK part of the North Sea.  Celtic Seas  Although the multiple surveys showed mixed signals within the Celtic Seas region for the typical length of the demersal fish assemblage (Figure 2), surveys in the north of the area suggest some recovery from previous low states with increases to the west of Scotland (Figure 1, left). However, decreases are also apparent for shelf edge waters to the west. Elsewhere the picture is similarly mixed with decreases near the Irish coast of the Irish Sea and in the Clyde area, but increases to the south of Ireland, Isle of Man, Sea of the Hebrides and The Minch.  The typical length of pelagic fish generally shows no long-term change at the sub-regional level (Figure 2). However, sub-divisional increases are seen to the south of Ireland and decreases in some northerly areas including the Sea of the Hebrides and in coastal areas in the Irish Sea (Figure 1, right).    pelagic fish  demersal fish    **Figure 1**. Summary of long term changes in the typical Length of demersal fish (left) and pelagic fish (right) communities in UK waters and surrounding areas (EEZ shown by sold black line). Assessment period starts in 1980s or 1990s and ends in 2015 or 2016 depending on the survey (see Figure 2).    **Figure 2**. Time series of the typical Length of demersal fish (top) and pelagic fish (bottom) communities by surveys that sample strata that are located (fully or partially) within UK waters. |
| Results (extended)  No Word limit | The summary results for each fish community (Figure 1) draw on multiple analyses for separate surveys. These individual results are shown below. A map of sub-divisions is given to identify which are measured by each survey and then these are followed by time series analyses. Time series are shown for each survey subdivision (see figure pane titles) and aggregated at survey level (title ‘sea’) for demersal and pelagic communities. Each subtitle shows the p value for supremum F test which demonstrates whether a significant long term change is evident (the changes are shown by red dashed lines when significant or else a mean level is shown for the whole time series using a grey dashed line). Annual estimates are shown by blue circles with a fitted LOESS smooth plot (black line) with an estimate of spread shown (+/- 1 standard deviation). Also shown a solid horizontal blue line with minimum observed data point prior to the most recent six data points and two horizontal thin black lines showing the average indicator value for the first and last six years.  Greater North Sea  **Figure a:** North Sea subdivisions used as a basis for GNSIntOT1, GNSIntOT3, GNSNetBT3 analyses (Figures b-f)    **Figure b:** GNSIntOT1 Demersal fish community    **Figure c:** GNSIntOT1 Pelagic fish community    **Figure d:** GNSIntOT3 Demersal fish community    **Figure e:** GNSIntOT3 Pelagic fish community    **Figure f:** GNSNetBT3 Demersal fish community      **Figure g:** English Channel subdivisions used as a basis for GNSEngBT3 analyses (Figure h)    **Figure h:** GNSEngBT3 Demersal fish community in the Channel    **Figure i**: GNSFraOT4 Pelagic fish community in the Channel (no further sub-division)  GNSFraOT4_PEL_TyL_LVL  Celtic Seas  **Figure j:** Irish Sea subdivisions used as a basis for CSEngBT3, CSNIrOT1 and CSNIrOT4 analyses (Figures k-o)    **Figure k**: CSEngBT3 Demersal fish community  CSEngBT3_DEM_TyL_LVL  **Figure l**: CSNIrOT1 Demersal fish community  CSNIrOT1_DEM_TyL_LVL  **Figure m**: CSNIrOT1 Pelagic fish community  CSNIrOT1_PEL_TyL_LVL  **Figure n**: CSNIrOT4 Demersal fish community  CSNIrOT4_DEM_TyL_LVL  **Figure o**: CSNIrOT4 Pelagic fish community  CSNIrOT4_PEL_TyL_LVL  **Figure p**: West of Scotland subdivisions used as a basis for CSScoOT1 analyses (Figures q-r)    **Figure q**: CSScoOT1 Demersal fish community  CSScoOT1_DEM_TyL_LVL  **Figure r**: CSScoOT1 Pelagic fish community  CSScoOT1_PEL_TyL_LVL  **Figure s**: West of Scotland subdivisions used as a basis for CSScoOT4 analyses (Figures t-u)    **Figure t**: CSScoOT4 Demersal fish community    **Figure u**: CSScoOT4 Pelagic fish community  CSScoOT4_PEL_TyL_LVL  **Figure v**: Celtic Sea subdivisions used as a basis for CSFraOT4 analyses (Figures w-x)    **Figure w**: CSFraOT4 Demersal fish community  CSFraOT4_DEM_TyL_LVL  **Figure x**: CSFraOT4 Pelagic fish community  CSFraOT4_PEL_TyL_LVL  **Figure y**: Rockall Bank subdivisions used as a basis for WAScoOT3 analyses (Figures z-aa)    **Figure z**: WAScoOT3 Demersal fish community  WAScoOT3_DEM_TyL_LVL  **Figure aa**: WAScoOT3 Pelagic fish community  WAScoOT3_PEL_TyL_LVL |
| Results (figures & tables) | **Figure 1**. Summary of long term changes in the typical Length of demersal fish (left) and pelagic fish (right) communities in UK waters and surrounding areas (EEZ shown by sold black line) |
| Conclusion (brief)  (200 words) | The UK target has probably not been met in the UK North Sea nor the UK Celtic Seas. In the North Sea, the Typical Length of demersal fish remains relatively low, but recovery since 2010 is underway, which is driven by increases in the northern North Sea. Long-term decreases, since the 1980s, were evident in the southern and central North Sea, implying that the demersal fish communities there are more dominated by small-bodied fish at present. In contrast, no change was evident in the North Sea pelagic fish community. Within the UK waters of the Celtic Seas, either no change or long term increases were observed throughout much of the area (with the exception of one survey). Some decreases were detected at smaller scales. Recovery appears underway in the demersal fish communities since 2000 in the West of Scotland and Rockall Bank area.  Given that the methodology is new there is moderate/ low confidence in the method for this assessment and high confidence in the data availability. |
| Conclusion (extended)  No word limit | The Typical Length of fish and elasmobranch community responds to changes in the dynamics in the size distribution across the full assemblage including both large and small fish, yet the indicator is still robust to outliers in the data. Typical Length can be directly compared across geographical regions and the indicator can be computed for pelagic or demersal species. The sub-divisional strata are a useful means to capture local patterns in indicators for specific benthic and water column habitats and the often-local impacts of pressures.  Within the North Sea there are clear sub-divisional differences where the demersal and pelagic assemblages in the northerly areas are recovering, while the southerly areas continue to decline. For the Celtic Seas, decreases in the demersal fish assemblage appear greatest at the shelf edge, while decreases in pelagic fish occur in coastal areas.  While fishing may have contributed to this depletion, it is unclear whether warming temperatures have led to increases in small-bodied fish, i.e. young fish and/or small species.  Additional surveys were assessed in addition to the key surveys for each sub-region and conclusions from these additional surveys generally confirmed the overall conclusion. Further details are given here by survey.  The increase in the typical length of demersal fish since 2010 in the Greater North Sea, evident in the IBTS quarter 1 survey, was also shown in the quarter 3 survey (GNSIntOT1 and GNSIntOT3), while the more spatially restricted groundfish surveys showed no significant change (GNSNetBT3, GNSEngBT3). For pelagic fish, no change was evident in the two IBTS in the North Sea.  Within the Celtic Seas, increases in typical length of demersal fish were evident to the west of Scotland in two surveys (CSScoOT1 since a low value in 2010 and CSScoOT4 since 2005), increases were evident in the Irish Sea in two surveys (CSNIrOT1 and CSNIrOT4 since 2010) with no change in a third (CSEngBT3). The pelagic fish generally showed no significant changes in typical length, with the exception of a decrease in the Irish Sea in one survey (CSNIrOT4 in 1998). An overall increase since 2002 in the typical length of demersal fish in the Rockall Bank was significant while no change in the typical length of pelagic fish was evident. |
| Knowledge gaps (brief)  (100 words) | Further work is required to evaluate appropriate baselines and thresholds for this indicator. This work is needed, because any historical baseline for the fish and elasmobranch community is likely to represent an impacted state. Thresholds should preferably be identified through multi-species modelling. |
| Knowledge gaps (extended)  No word limit | Setting of assessment values for this indicator should consider their relation to the Common Fisheries Policy targets aiming at Maximum Sustainable Yield and in relation to other fish community indicators.  Until more comprehensive investigations are complete, the minimum observed typical length in the available time-series can be considered as a precautionary limit for the indicator. If indicator scores are at a minimum observed state, a positive (increasing) trend should be evident to avoid falling below the limit.  While reductions in fishing pressure in recent years appear to be stimulating improvements in the size structure of demersal fish in some areas it should not be forgotten that the OSPAR maritime area has also warmed significantly recently (IPCC, 2014). These prevailing conditions may mean that the species composition is changing. Since Lusitanian (warm-water southern) species tend to be smaller bodied than boreal (cold-water northern) species, the size-structure may require longer than expected to recover to its historic values, if possible.  *References*  IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. |

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| HBDSEG UK MSFD Art 8 Biodiversity Indicator Assessments – VERSION CONTROL | | | |
| **Version** | **Circulated to** | **Changes made to previous versions** | **Updated/Approved by** |
| 1.0 | Defra on 13/07/17 |  | Signed off by HBDSEG on 06/07/17 (Intersessionally)  Subsequent minor edits by HBDSEG assessment co-ordinator (JNCC). 05/07/2017 |
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