COMMISSION OSPAR

Composition des communautés halieutiques par taille

Évaluation de l'Indicateur Commun

OSPAR
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Composition des communautés halieutiques par taille

Contributeurs

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Message clé

L'indicateur de longueur type mesure la structure de taille des communautés de halieutiques et il diminue en cas de forte pression de pêche. Par rapport aux années 1980, l'indicateur est faible dans les Régions de la mer du Nord au sens large et des mers celtiques, mais il a augmenté dans de grandes parties des mers celtiques centrales et du nord du golfe de Gascogne.

Contexte

L'objectif stratégique d'OSPAR en ce qui concerne la biodiversité et les écosystèmes est de protéger et préserver la biodiversité marine, les écosystèmes et leurs services, dans le but d'atteindre un bon état des espèces et des habitats, et ainsi maintenir et renforcer la résilience des écosystèmes.

L'indicateur de la longueur type est l'un des multiples indicateurs du réseau trophique utilisés actuellement par OSPAR pour évaluer les communautés halieutiques. Il représente la longueur moyenne des poissons (poissons osseux démersaux et élasmobranches) et donne des informations sur la structure des tailles dans les communautés halieutiques. On calcule cet indicateur à partir des données sur les captures d'espèces échantillonnées dans le cadre d'études scientifiques. Les communautés sont représentées par des assemblages trophiques (groupes halieutiques) reposant sur l'habitat, en l'occurrence les assemblages démersaux (c'est-à-dire les espèces vivant dans les fonds marins ou à proximité) au sein des subdivisions écologiques. Les assemblages pélagiques (c'est-à-dire les espèces vivant dans la colonne d'eau) sont étudiés dans le cadre d'autres indicateurs portant sur le niveau trophique moyen et la biomasse des guildes alimentaires.

La mortalité due à la pêche réduit la structure des âges des populations halieutiques, limitant la proportion d'individus de plus grande taille (**Figure 1**). On s'attend à un déclin graduel et régulier de la longueur type du fait des fortes pressions de pêche, mais la pêche au rendement maximal durable devrait conduire à un rééquilibrage de l'indicateur (Spence et al., 2021). En effet, la structure des tailles des assemblages halieutiques tient compte des impacts des pressions exercées par la pêche sur de longues périodes. Les simulations de modèles montrent que, dans les réseaux trophiques, lorsque les interactions entre les prédateurs et les proies l'emportent sur d'autres interactions, les espèces de grande taille à des niveaux trophiques élevés (position des espèces dans le réseau trophique) sont extrêmement sensibles à la perte de diversité à des niveaux trophiques plus bas. En raison du déclin des piscivores de grande taille, on observe une baisse de la mortalité des petits poissons fourrage par prédation, ce qui réduit encore la longueur type et révèle un impact négatif sur les réseaux trophiques.

Figure 1: Loup de l'Atlantique de grande taille (© Jim Ellis)

Contexte (version étendue)

The distribution of biomass over body size (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, and ectotherm and endotherm vertebrates using data on multiple ecosystems. Model simulations (Rossberg *et al.*, 2008) have demonstrated that in food webs 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 fish body size 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 rising 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).

The indicator is aggregated at the survey level within each region assessed and complemented by subdivisional analyses at a scale appropriate to pressures and habitats that can be highly localised.

Subdivisional metrics are aggregated by a weighted average where those weights are given by the total surveyed biomass of relevant assemblage in each subdivision.

Méthode d'évaluation

The Typical Length (TyL) is the weighted geometric mean length of fish, with weights given by the standardised catch rate of individuals in an area and defined as follows:

$$TyL = exp\left[\frac{\sum_{i=1}^{N} M_i \ln L_i}{\sum_{i=1}^{N} M_i}\right]$$

where M_i is the body mass (standardised to kilogrammes per unit area fished) of the *i*-th fish with length L_i (in units of centimetres) 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, Lynam and Rossberg, 2017). 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; Walker *et al.*, 2017). However, such estimates are sparse in the scientific literature and prone to great uncertainty. Alternatively, model-based estimates of absolute species abundance can be used to rescale observed abundances for some species (entire fish communities are not usually modelled), but here model uncertainty is also great (ICES, 2014b). For simplicity, Typical Length is defined with reference to a particular sampling design with a varying limitation to the size range sampled by fishing gear. For each survey, this indicator is calculated for subdivisions that represent different habitats and communities, where possible. Although each survey may provide a slightly different perspective to the reality, the surveys themselves are standardised so that they can be assumed to provide a consistent representation of that perspective over time.

The data are collected under the national programmes and the Data Collection Framework (EC, 665/2008). Currently, the most important data sources for Typical Length are those groundfish surveys that are conducted through the International Council for the Exploration of the Sea (ICES). The International Bottom Trawl Survey (IBTS) programme in the Greater North Sea, Celtic Seas, and Bay of Biscay and Iberian Coast is particularly important since the otter trawl gear used 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 (**Figure a**) and time series of Typical Length from such surveys may be preferable should sufficient length sampling of fish be made. The two gears (otter and beam) can therefore be assumed to provide complementary perspectives of the fish community.

Figure a: **Common sole (*Solea solea*) (© Hans Hillewaert)**

Data Used and Quality Assurance

The assessment draws on raw data from the ICES database of groundfish surveys (DATRAS, 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 are derived from each available groundfish survey, where the community is separated into demersal and pelagic habitat-based feeding assemblages.

Time series of Typical Length for demersal assemblages were determined for multiple surveys carried out across four OSPAR Regions: the Greater North Sea, Celtic Seas, Bay of Biscay and Iberian Coast, and Wider Atlantic (**Table a**). Ecological subdivisions were determined for the Greater 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 in 2013, and building upon work in the EU VECTORS project (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 other OSPAR Regions, the strata from the survey design were considered appropriate to represent the ecological subdivisions.

Standard data collected on these surveys consists of numbers of each species of fish sampled in each trawl haul, measured to defined length categories (i.e., so a fish with a recorded length of 14 cm would be between 14.0 cm and 14.9 cm in length). By dividing species and size-specific 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 (i.e., trawl haul). However, the indicator is based on biomass rather than abundance, so these abundance densities have to be converted to biomass density data by applying species weight (w) at length relationships (of the form $w = aL^b$, where a and b are species-specific parameters). Density estimates per length category per species based on biomass (kg per km^2) are referred to below as catch-per-unit-area (CPUA).

These trawl-sample density-at-length estimates are 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 Greater North Sea and generally depth-based strata elsewhere).

Table a: Groundfish trawl surveys, the Region in which they operate, and the period over which they have been undertaken

Sub-region	**Survey Acronym[1]**	**Survey Period**
Bay of Biscay and Iberian Coast	BBIC(n)SpaOT4	2011 – 2018
	BBIC(s)SpaOT1	2000 – 2020
	BBIC(s)SpaOT4	2002 – 2020
	BBICPorOT4	2002 – 2018
	BBICFraBT4	2011 – 2020
	BBICFraOT4[2]	1997 – 2020
Celtic Seas	CSFraOT4[2]	1997 – 2020
	CSEngBT3	1993 – 2019
	CSEngBT3 Bristol Channel	1993 – 2020
	CSIreOT4	2003 – 2020
	CSNIrOT1	2008 – 2020

	CSNIrOT4	2009 – 2020
	CSScoOT1	1985 – 2020
	CSScoOT4	1997 – 2020
Greater North Sea	GNSEngBT3	1990 – 2020
	GNSFraOT4	1988 – 2020
	GNSGerBT3	1997– 2020
	GNSBelBT4	2004 – 2020
	GNSIntOT1	1983 – 2020
	GNSIntOT1 Eastern Eng. Channel	2007 – 2020
	GNSIntOT3	1998 – 2020
	GNSNetBT3	1999 – 2020
Wider Atlantic	WAScoOT3	1999 – 2020
	WASpaOT3	2006 – 2018

[1.] Survey acronym convention: first two to four capitalised letters indicate the European Union Marine Strategy Framework Directive (MSFD) sub-region (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 (Spa: Spain; Por: Portugal; Fra: France; Eng: England; Bel: Belgium; Ire: Republic of Ireland; NIr: Northern Ireland; Sco: Scotland; Ger: Germany; Int: International; Net: The Netherlands).

International refers to the two international groundfish surveys carried out in the Greater North Sea under the auspices of ICES. In the Bay of Biscay and Iberian Coast sub-region, Spanish surveys are further delimited by (n) for surveys operating in the northern Iberian coast area and (s) for surveys operating in the southern Iberian coast area).

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 and Iberian Coast sub-regions, from the southern coast of the Republic of Ireland and down the western Atlantic coast of France. For assessment purposes this single survey was split into its two sub-regional components.

Data Treatment

Surveys with rectangular sampling grids (GNSIntOT1, GNSIntOT3, GNSNetBT3, GNSGerBT3, GNSBelBT3, GNSEngBT3, GNSFraOT4)

Catch per unit swept area (CPUA) data (kg / km^2) from multiple hauls are averaged by species for each rectangular grid cell using. In the Greater North Sea these are ICES statistical rectangles, in the eastern English Channel a mini-grid (0.25° by 0.25°) is used by GNSFraOT4. The resulting rectangle-based CPUA estimates are multiplied by the area (km^2) of their rectangles (using a Lambert equal area projection) to give species biomass-at-length (now measured in kg per rectangle). Subdivisional strata level (not GNSFraOT4) estimates of biomass-at-length are given by the sum of the rectangle-based biomass-at-length estimates and corrected by a scaling factor = 1 / (proportion of the area of subdivision monitored in the survey year) (units are now tonnes per subdivision). The scaling factor correction ensures that the weighting of the strata relative to each other in each year is not altered by the sampling levels. Subdivisional estimates of Typical Length are calculated at this point for investigating local responses of each assemblage.

Regional estimates of biomass-at-length are estimated from the sum of subdivisions (or in the case of GNSFraOT4 by the rectangle-based estimates). Typical Length is calculated from these data to give a survey level assessment within each region.

Surveys with Irregular Depth Banded Strata (i.e., all surveys other than those with Rectangular Sampling Grids)

Catch-per-unit-area (CPUA) data (kg/km^2) from multiple hauls are averaged by species for each survey strata. Subdivisional estimates of biomass-at-length are subsequently given by CPUA multiplied by area of the survey strata (km^2, using a Lambert equal area projection). Subdivisional estimates of Typical Length represent the local status of the fish community.

Regional estimates of biomass-at-length are estimated from the sum of subdivisions. The regional assessment of Typical Length is thus based on these summed subdivisional estimates.

Overall Assessment Basis

Where multiple surveys were available for assessment, key surveys were prioritised for assessment given the length of time series available and spatial coverage. If these measures were equal between surveys, then whichever surveyed the greatest biomass by assemblage was selected for indicator assessment. The following surveys were considered key:

Greater North Sea

GNSIntOT1 was selected as the key survey (preferred) for the Greater North Sea, given that it is the longest survey with the best spatial coverage. For the eastern English Channel, GNSEngBT3 was preferred given more consistent sampling here than GNSIntOT1 and GNSFraOT4.

Celtic Seas

CSScoOT1 was preferred over CSScoOT4 and CSIreOT4 due to length of time series. CSIreOT4 was preferred for subdivisions to the west of Ireland and in the northern Celtic Seas, but not in the north where there was overlap with CSScoOT1. CSFraOT4 was preferred in subdivisions of the Celtic Seas, except where overlap occurred with CSIreOT4. CSEngBT3 was preferred for the Irish Sea over CSNIrOT1 and CSNIrOT4 given the greater length of the survey.

Bay of Biscay and Iberian Coast

BBICsSpaOT1 was preferred over BBICsSpaOT4 given the length of the survey. CSBBFraOT4, BBICPorOT4 and BBICnSpaOT4 did not overlap with any other surveys. BBICFraOT4 was preferred over BBICFraBT4 due to length of survey.

Time-Series Assessment

The long-term trend in each time series (subdivision and survey level) was modelled through the application of a LOESS smoother (i.e., locally weighted scatterplot smoothing) with a simple 'fixed span' of one decade.

Breakpoint analyses uses data to define stable underlying periods (see Probst and Stelzenmüller, 2015). The method makes it possible to say whether there is a significant change in the time series state over time, namely whether the recent period is not significantly different from the historically observed period. The method avoids the arbitrary choice of reference periods for assessment (i.e., how many years to use to calculate an average) which can lead to subjective assessments. The shorter the period chosen, the more likely it is that noise in the data or natural fluctuations in the system are being compared against each other. However, too long a period and it could be that actual changes in state are averaged out. The minimum detectable period is defined in this analysis as six years and is assumed to be appropriate to capture the response of the fish community as opposed to noise (note that in the IA2017 assessment the minimum period was set as three years). The analysis uses two statistical approaches: First applying the 'supremum F test' to establish whether a non-stationary time series or a constant period for the entire time series is more suitable. If the former, then breakpoint analysis is applied to find periods of at least six years duration.

Populations should have a size structure indicative of sustainable populations and should occur at levels that ensure long-term sustainability in line with prevailing conditions. There should be no significant adverse change in the structure or function of fish assemblages due to human activities. The current assessment uses a time-series approach to identify long-term changes in state and further investigation is required to identify if reductions in the size structure of assemblages is due to human activities, food web interactions or prevailing climatic conditions. Analytical baselines are not currently available to determine assessment thresholds in terms of size-structure associated with healthy and sustainably fished assemblages. Nevertheless, fishing at Maximum Sustainable Yield in the North Sea has been shown to lead to gradual recovery in the indicator from current levels under currently prevailing conditions (Spence *et al*., 2021). Despite the lack of an agreed outcome for a healthy ecosystem, a lower limit can be defined based on the lowest level of the indicator observed previously. If the most recent stable period is below all previous stable states (i.e., the indicator is at the minimum observed level and the ecosystem is more dominated by small individuals than ever observed previously) the indicator cannot be said to have achieved the threshold for 'no adverse change'. Therefore, an indicator outcome at the lowest stable state is defined as not-achieved.

If the indicator has increased relative to previous periods or has not been observed to decline in the long-term the threshold ‘no adverse change’ is defined here as achieved.

Résultats

Mer du Nord au sens large

On observe des résultats mitigés concernant la longueur type (TyL) dans l'ensemble de la Manche orientale. Dans l'étude la plus longue (GNSEngBT3, depuis 1990), on observe des changements à long terme dans la zone côtière du Royaume-Uni (augmentation depuis 1997) et dans la zone côtière française (diminution depuis 2014) (**Figures 3** et **4**). Toutefois, l’étude GNSFraOT4 (depuis 1998) révèle une forte tendance à la hausse dans l’ensemble de la subdivision, tandis que l’étude plus récente GNSIntOT1 met en évidence une situation variable (**Figures 4** et **5**).

Dans la mer du Nord (y compris le Kattegat), l’étude la plus longue, c'est-à-dire GNSIntOT1, montre que la longueur type diminue à long terme jusqu’à atteindre un niveau minimal pendant les années 1990, avant le début de l’étude GNSIntOT3 et des études effectuées par chalut à perche (**Figures 3** et **5**). L’étude GNSIntOT1 met en évidence un rééquilibrage partiel à partir du niveau minimal dès le début des années 2000, mais cette série ainsi que la série temporelle plus courte dérivée de l’étude GNSIntOT3 (à partir de 1998) sont variables et n’affichent pas de tendance claire depuis lors. L’indicateur mesuré dans la mer du Nord révèle les tendances générales suivantes : une diminution due aux changements antérieurs à 1990 dans chaque subdivision (**Figure 6**), suivie d'une reprise dans les deux zones les plus septentrionales au cours des années 2000 et d'une situation variable sans tendance claire dans les années 2010.

Les données plus récentes des études effectuées par chalut à perche pour les parties centrale et méridionale de la mer du Nord révèlent un diminution générale en 2005 (**Figure 5**) (enquête GNSNetBT3) due aux changements dans la partie centrale (**Figure 7**) et dans le sud-est de la mer du Nord (enquête GNSBelBT3, **Figure 8**).

Mers celtiques

Les études effectuées dans la région des mers celtiques ont produit des résultats variés (augmentations, diminutions, et aucun changement) (**Figure 3)**. Des augmentations générales ont été constatées dans la mer d’Irlande (CSEngBT3) et le canal de Bristol (CSEngBT3_Bchannel), ainsi que dans une grande partie des mers celtiques au sud de l’Irlande. Cependant, au sud de la Région, des diminutions dans les eaux profondes du bord du plateau continental (CSFraOT4, **Figure 3**) ont été constatées.

Une étude (CSScoOT1) a démontré une diminution générale dans la zone située à l’ouest de l’Ecosse (**Figures 4** et **5**). Cependant, l’étude CSScoOT4, plus brève, a permis de mettre en avant des signes de rétablissement depuis 2005 (**Figures 4** et **5**). Dans le cadre de l’étude CSScoOT1, une augmentation de la longueur type a été constatée dans une petite subdivision au nord de l’Ecosse (**Figures 3**) au milieu des années 2000, aussi valable pour l’indicateur pour les eaux du Minch entre l’Ecosse continentale et les Hébrides du Nord (**Figures 3**). Néanmoins, les valeurs pour la subdivision de la Clyde au sud-ouest de l'Écosse et les eaux profondes du bord du plateau continental restent faibles par rapport aux années 1980 (**Figures 3**).

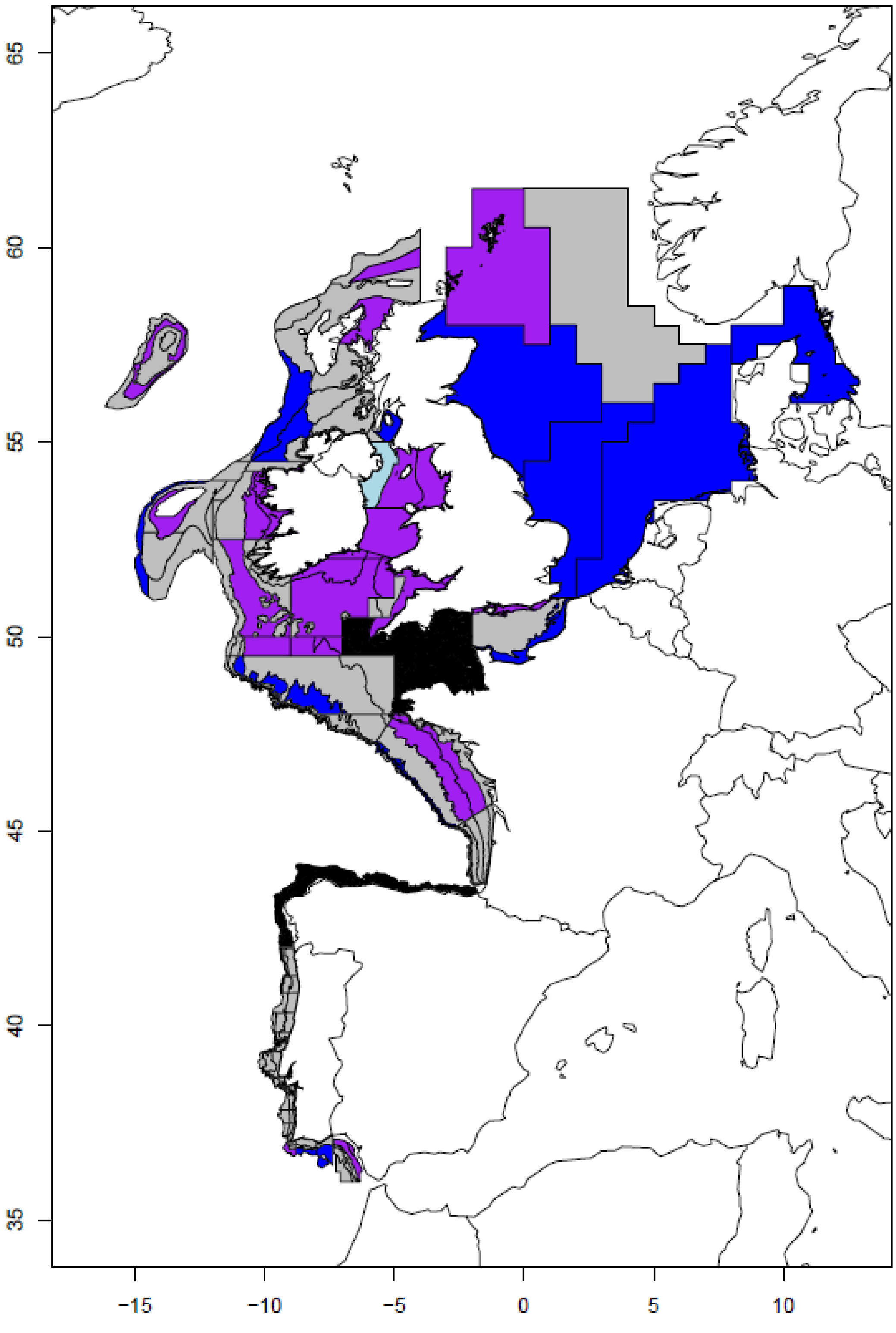

Figure 3: **Schéma spatial des résultats de l'indicateur de longueur typique par subdivision pour les enquêtes préférentielles par région. La couleur violette indique une augmentation à long terme évidente ; le bleu foncé indique une diminution jusqu'au niveau minimum ; le bleu clair indique une diminution jusqu'à un niveau faible mais non minimum. Les zones grises indiquent les zones où aucun changement à long terme**

n'est évident et les zones noires indiquent les enquêtes trop courtes pour détecter un changement à long terme.

Golfe de Gascogne et côte ibérique

Dans le golfe de Gascogne et la côte ibérique, cinq études n'ont montré aucun changement dans l'ensemble. Seulement une étude (BBICSpaOT1) a mis en avant une augmentation dans les zones méridionales de la côte ibérique (**Figure 3**). Bien qu'il n'y ait pas de tendance générale dans les eaux portugaises, l'étude BBICPorOT4 fournit des preuves d'une diminution dans deux subdivisions de la côte sud et une augmentation dans une autre subdivision. Dans le nord du golfe de Gascogne, il n'y a pas de tendance générale, mais deux subdivisions sur le plateau sont en augmentation, tandis que la longueur type (TyL) sur le bord du plateau est en diminution.

Atlantique au large

Aucun changement global n'a été mis en évidence.

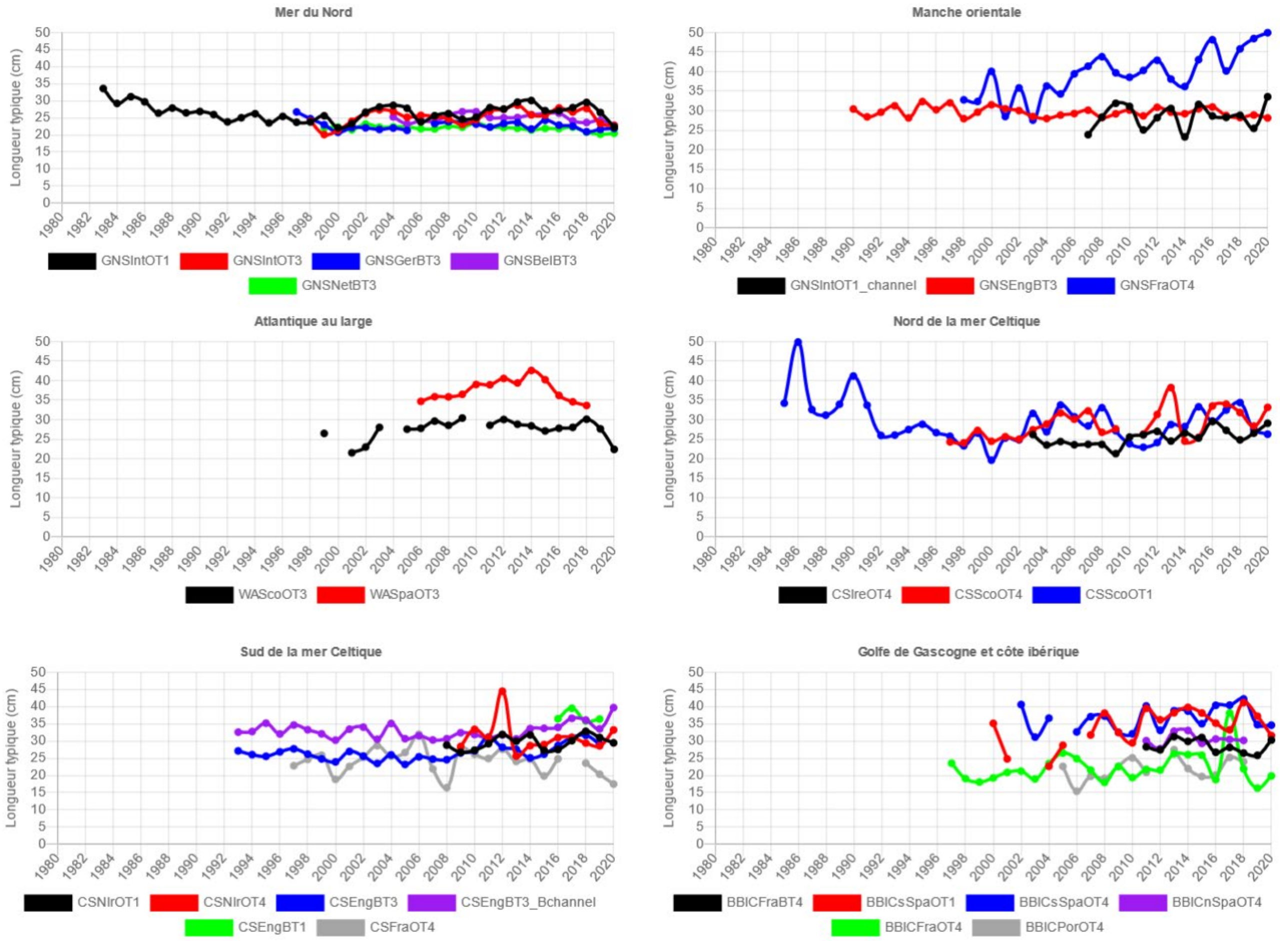

Figure 4: Séries temporelles de la longueur typique par enquête, montrant des modèles lissés par LOESS, où les enquêtes qui se chevauchent au sein des régions sont regroupées.

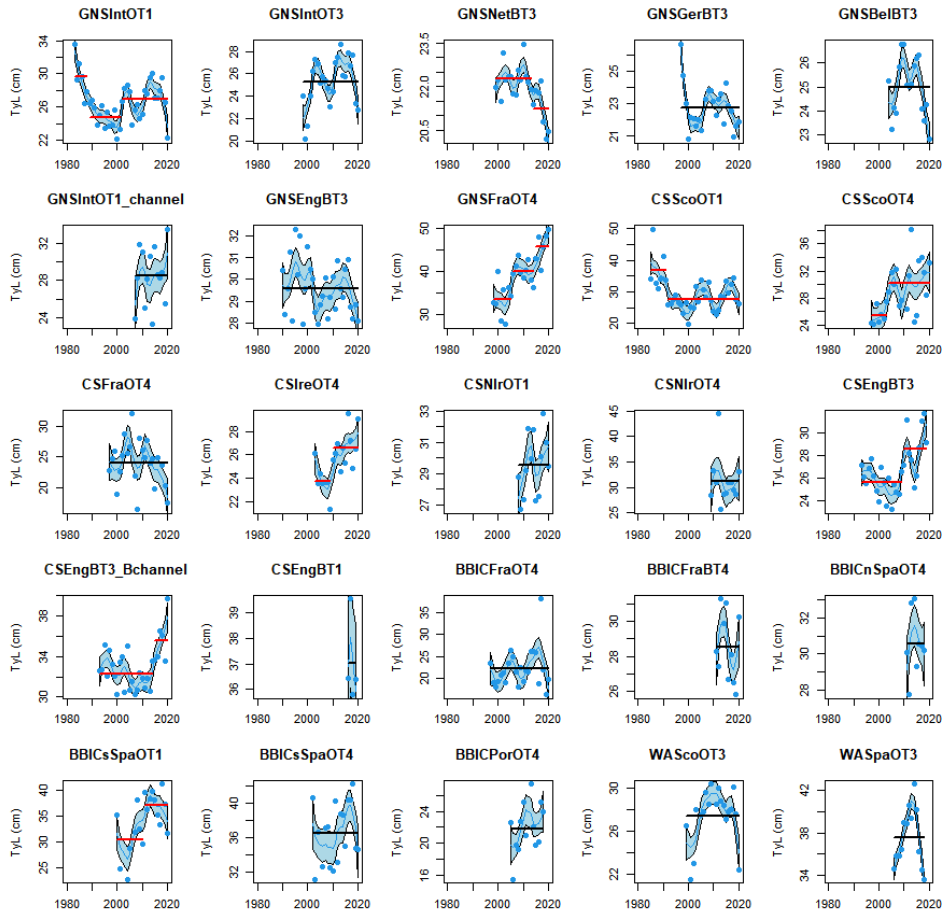

Figure 5 : **Séries temporelles de la longueur typique par enquête montrant les points de données, les modèles lissés par LOESS et les périodes stables (en noir si elle est constante sur la période évaluée et en rouge si un point de rupture est détecté).**

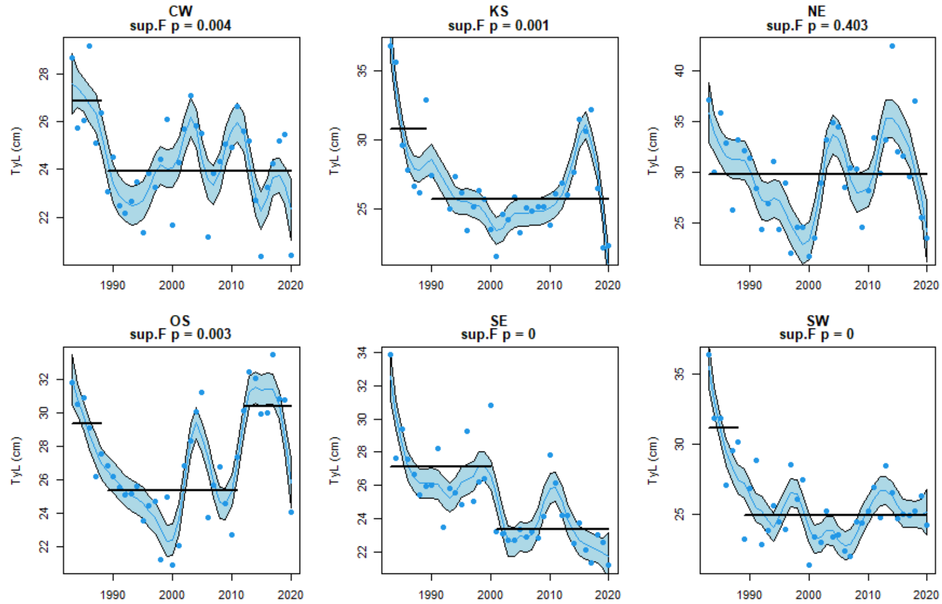

Figure 6 : **Changement des subdivisions en mer du Nord (GNSIntOT1), où CW est centre-ouest, KS est Kattegat-Skagerrak, NE est nord-est, OS est Orkney-Shetland, SE est sud-est et SW est sud-ouest.**

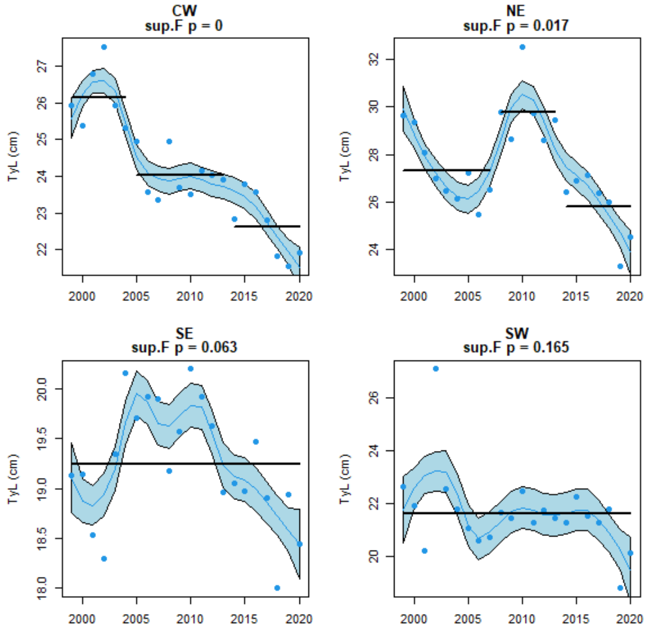

Figure 7 : **Changement des subdivisions en mer du Nord (GNSNetBT3)**

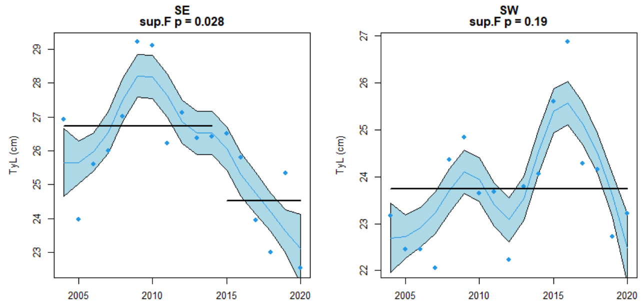

Figure 8 : **Changement des subdivisions en mer du Nord (GNSBelBT3)**

Conclusion

Il n'y a pas de tendance cohérente pour l'ensemble de la zone maritime OSPAR. Des augmentations ont été constatées dans l'ensemble de la mer d'Irlande, dans le canal de Bristol, dans une partie du banc Porcupine, dans une petite subdivision au nord de l'Écosse et dans la zone des îles du Nord (Orkney et Shetland) de la mer du Nord, dans certaines parties du nord du golfe de Gascogne et dans le nord de la mer Celtique.

Des baisses jusqu'aux valeurs minimales ont été constatées dans le centre et le sud de la mer du Nord et dans le Kattegat, ainsi que dans certaines parties du bord occidental du plateau, dans la zone du Clyde et au sud du Portugal et dans une partie de la côte nord de la France.

Lacunes dans les connaissances

Des travaux supplémentaires sont nécessaires pour fixer des valeurs de référence et des valeurs d'évaluation adéquates pour cet indicateur. En effet, il est fort probable que toute valeur de référence historique pour les communautés halieutiques et d'élasmobranches représente un état dégradé. Il faudra identifier des valeurs d'évaluation, de préférence grâce à une modélisation basée sur des espèces multiples.

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Métadonnées d'évaluation

Champ	**Type de données**	
Type d'évaluation	Liste	Évaluation d'indicateur
Résumé des résultats	URL	https://odims.ospar.org/en/submissions/ospar_size_comp_fish_msfd_2022_06_001/
Indicateur ODD	Liste	14.2 D'ici à 2020, gérer et protéger durablement les écosystèmes marins et côtiers, notamment en renforçant leur résilience, afin d'éviter les graves conséquences de leur dégradation et prendre des mesures en faveur de leur restauration pour rétablir la santé la productivité des océans
Activité thématique	Liste	Diversité biologique et écosystèmes
Documentation OSPAR pertinente	Texte	Agreement 2018-05 CEMP Guideline: FW3 Combined guideline for processing of survey data for fish and food webs common indicators FC2, FC3, FW3 and FW7
Date de publication	Date	2022-06-30
Conditions d'accès et d'utilisation	URL	https://oap.ospar.org/fr/politique-de-donnees/
Instantané de données	URL	https://odims.ospar.org/en/submissions/ospar_size_comp_fish_dsnap_2022_06/
Résultats des données	Fichier Zip	https://odims.ospar.org/en/submissions/ospar_size_comp_fish_dres_2022_06/

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Notre vision est celle d'un océan Atlantique Nord-Est propre, sain et biologiquement diversifié, qui soit productif, utilisé de manière durable et résilient au changement climatique et à l'acidification des océans.

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