JOINT OSPAR/HELCOM/ICES WORKING GROUP ON SEABIRDS (JWGBIRD; outputs from 2021 meeting)

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Contents

i Executive summary

The 2021 annual meeting of the Joint ICES/OSPAR/HELCOM Working Group on Seabirds was held as an online event from 8 to 11 November 2021. The meeting was chaired by Matt Parsons and Volker Dierschke (with Nele Markones on sick leave) and was attended by 40 members representing 17 countries. Following preceding meetings, the objectives of the meeting were to develop and implement indicators for seabirds under the Marine Strategy Framework Directive (MSFD), to review bird assessments within OSPAR and HELCOM, and to review and discuss seabird-related impacts of anthropogenic activities at sea. The meeting consisted of a series of interconnected workshops, where subgroups with floating membership discussed the Terms of Reference. Report chapters were drafted by Term of Reference leads and collated.

According to Descriptor 10, the MSFD requires that “Properties and quantities of marine litter do not cause harm to the coastal and marine environment”. JWGBIRD reviewed prevalence and impacts of litter ingestion, entanglement, and nest incorporation of litter in seabirds. The group provided expert opinions on information and knowledge gaps as well as proposals for best practice for future research and monitoring with respect to assessing good environmental status. A key priority, especially in relation to MSFD assessments, is quantifying the adverse effects of litter interactions on species by measuring population level effects.

The group reviewed timelines, status and demands of bird assessments within OSPAR and HELCOM, with reference to the next holistic assessments, OSPAR QSR2023 and HELCOM HOLAS 3. Both holistic assessments aimed at basing the assessment on more indicators. Consequently, JWGBIRD continued to develop new indicators such as the D1C1 bycatch indicator and D1C5 bird habitat quality indicator, and to refine existing ones, e.g. by revising the methodology of the D1C3 breeding productivity indicator as well as by including at-sea data in the D1C2 abundance indicator.

The 2021 annual meeting of JWGBIRD took place during a period in which data submission was still underway (HELCOM) or had just recently been finalised, but no evaluation results were ready yet. Thus, the group only reviewed the status of indicator development and the proposed structure of the thematic assessment that will be based on the integration of indicator assessments and other relevant information relating to status.

In addition, the group reviewed the methods for assessing and reporting confidence in OSPAR and HELCOM assessments defined by the two conventions.

Inclusion of at-sea data in future bird assessments was further supported by revitalizing the European Seabirds at Sea (ESAS) database. A dedicated project, funded as part of the Dutch WOZEP research program and carried out under the lead of INBO, collated information on existing Seabirds at Sea monitoring programmes, updated the existing ESAS data collation by new datasets from Belgium, The Netherlands and Germany and prepared migration of the database to the ICES Data Centre.

JWGBIRD supported the ICES Advisory Services by provided input on matters related to interactions between marine birds and anthropogenic activities at sea, particularly on incidental captures (bycatch) in fishing gears. Specifically, JWGBIRD supported the ICES roadmap for bycatch advice by providing additional sources of bycatch data not yet referenced in WGBYC reports. The group also reviewed the section of the WGBYC 2021 report addressing a request from NEAFC to compile and aggregate available data on bird bycatch in the NEAFC regulatory area, including the spatiotemporal distributions of the bird species vulnerable to bycatch and related information on the associated fisheries.

ii Expert group information

Expert group name	Joint OSPAR/HELCOM/ICES Working Group on Seabirds (JWGBIRD)
Expert group cycle	Multiannual fixed term
Year cycle started	2020
Reporting year in cycle	1/3
Chairs	OSPAR chair: Matt Parsons, UK
	HELCOM chair: Volker Dierschke, Germany
	ICES chair: Nele Markones, Germany
Meeting venue and dates	8–12 November 2021, online meeting (40 participants)

1 Litter ingestion, entanglement, and nest incorporation of litter in seabirds

The following section uses the most-recent reviews of work carried out on litter pollution and seabirds to provide expert opinions on information and knowledge gaps as well as proposals for best-practices for future research and monitoring.

1.1 Introduction

In this section the term “litter” represents all human-made objects and fragments of those objects, including plastics; and the term “plastics” represents all artificial polymer materials, considering mainly visibly detectible meso- and macro-plastic objects and fragments.

There are three main areas of interaction between seabirds and litter:

- Ingestion of pieces and fragments of plastics and other litter during feeding. This can occur directly, either through eating the remains of human food, which are attached to packaging (gulls), or through mistaking pieces of litter for food items (e.g. fulmar, auklets, phalaropes). It can also occur indirectly, through eating prey species (e.g. fish, benthic organisms, plankton, birds) that contain litter or fragments (which, depending on the prey species, can be microplastic) in their digestive tract (includes probably all species). Ingestion of plastics can lead to a transfer of pollutants contained in or adsorbed on the plastic to bird tissues.
- Entanglement in litter e.g. fishing nets, fishing line, rubber balloons, plastic bags and sheeting, metal cans etc.
- The incorporation of litter in nest material, which in turn can lead to entanglement and mortality of seabirds.

The Marine Strategy Framework Directive (EU 2008) requires the assessment of litter in the Marine environment. Descriptor 10 of the MSFD is “Properties and quantities of marine litter do not cause harm to the coastal and marine environment”. The Commission Decision (EU 2017) lays down criteria and methodological standards on good environmental status of marine waters and specifications and standardized methods for monitoring and assessment.

In the Commission Decision two secondary criteria relate to the interaction between birds and litter:

- D10C3: The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned.
- D10C4: The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects.

For both criteria, Member States shall establish lists of species and establish threshold values through regional or subregional cooperation. For D10C4 the assessment should be of the number of individuals affected (lethal; sublethal) per species.

The concept of “harm” to biota in connection with marine litter is discussed in Werner *et al*. (2016). They report that individual suffering and death as a consequence of litter ingestion have been documented for all groups of air-breathing marine life, including birds, but go on to say that sublethal effects on birds are hard to quantify and difficult to link directly with litter ingestion, because a combination of numerous factors determines the fitness of individuals and the population as a whole. They conclude that present knowledge implies evidence of harm in natural populations but quantifying the extent of this harm is going to be extremely challenging. This means that for criteria D10C3 it will be difficult to collect conclusive evidence of effects on the species level. However, approaches for setting threshold values are discussed by Werner *et al*. (2020).

The transfer of chemical substances from plastics to bird’s tissues is a further issue related to litter pollution in the marine environment. This paper does not cover this interaction although it can certainly contribute to the adverse effects on health pertaining to marine litter. Present knowledge of this aspect of the seabird-litter interaction is presented and discussed in Werner *et al*. (2016).

The two main aims for studying the interaction with litter are:

- to use the data to assess the level of harm to the species involved and thus to the marine environment in general (see Werner *et al*., 2016);
- to use the data on litter interactions with birds as indicators of the occurrence, amount, spatial variation in abundance and trends of litter pollution in the marine environment.

1.2 Methods available for studying the interaction between seabirds and litter

There are three main techniques for investigating litter in the gastro-intestinal tract of birds:

- biopsy of the digestive tract of birds washed ashore or killed by humans (i.e. hunting, drowning in fishing nets),
- dissection of boluses (pellets), which can be collected at breeding sites or roosts,
- analysis of the regurgitated contents of the digestive tract of birds. This includes natural regurgitation by birds in the hand or at breeding sites and forced regurgitation through the use of lavage or flushing and emetics.

The pros and cons of these three methods are presented in detail by Provencher *et al*. (2019) and are, therefore, not repeated here. Studies of litter in the gastrointestinal tract of birds usually concentrate on visibly detectable litter objects and fragments and usually not microplastics. Microplastics are considered to be able to pass through the digestive tracts of birds (Kühn and van Franeker, 2020) and it is considered to be difficult to detect the presence of all plastics smaller than 1 mm in bird stomachs (O'Hanlon *et al*., 2017). A further, developing, method is the analysis of guano to investigate ingestion of plastics, and whether microplastics in guano can be used as an indicator of retained plastics in the gastrointestinal tract (Provencher *et al*., 2018). Detection of plasticizers in preen gland oil (Hardesty *et al*., 2015; Yamashita *et al*., 2021) and X-ray examination of individuals (Carapetis *et al*., 2010) have also been used to identify interactions between seabirds and litter.

Methods for nest incorporation of litter include:

- Visual observation of nests.
- Dismantlement of nests.

O'Hanlon *et al*. (2019) applied methods for assessing litter in nests of Northern Gannets across their range based on visual observation of nests directly at the colony as well as using photographs of nests taken in colonies. An EU-Standard MSFD protocol for the monitoring of litter as nesting material in seabird breeding colonies and associated entanglement mortality is recommended by the Technical Group on Marine Litter (Galgani *et al*., 2013). It is currently under review and will be updated soon. The protocol is designed for easy application in breeding colonies of various species of seabirds. This protocol and the protocol designed for use on the Northern Gannet colony on Helgoland (S. Garthe and N. Guse pers. comm.) propose classifying the litter according to the litter types on The Joint List of Litter Categories for Monitoring Macroplastic (Fleet *et al*., 2021) and where possible according to sources e.g. fishing, shipping, recreational/consumer. O'Hanlon *et al*. (2019) categorized litter by type (sheet, thread, foam, hard, other including non-plastic items) as specified by Provencher *et al*. (2017), and potential source (fishing activities, consumer items, unknown). Litter in European Shag nests is already used as an indicator of marine pollution in France (Cadiou *et al*., 2011; Cadiou and Fortin, 2015). This species, and the associated protocol, has been suggested for being suitable more widely as an indicator relating to entanglement as part of the MSFD (Claro *et al*., 2019; Galgani *et al*., 2014).

The TGML protocol does not deliver standard methods for recording the intensity of litter incorporation, which probably need a species-specific approach. O'Hanlon *et al*. (2019) recorded the percentage by surface area of each gannet nest that was comprised of litter, estimated to the nearest 5%. In cases where <5% of the nest's surface was comprised of litter, the surface area of visible litter was estimated to the nearest 1%. However, it was acknowledged that this method is unlikely to be repeatable between observers, and therefore a more standardized method of accurately assessing the amount of visible litter in nests is required. Where high quality photographs can be taken, trails have successfully been carried out using image software to provide a more standardized, and repeatable, method of quantifying the extent of visible litter at the surface of nests (for Herring Gull: Thompson *et al*., 2020; Northern Gannet: Grant *et al*., 2021).

The frequency of occurrence of nests containing visible debris at their surface (nest-litter rates in relation to all active nests) is the standard parameter used by all three examples. At the breeding colony on Helgoland, Germany different classification systems were used for estimating the intensity of nets/net remains and cords/ropes/packaging incorporated into nests (see Table 1.1).

Table 1.1. Classification system for the intensity of nest incorporation of litter used at the Northern Gannet colony on Helgoland, Germany.

Class	Nets / net remnants	Cords / ropes / packaging
0	No net or net remains in the nest	No string, rope, packaging in the nest
1	Up to 1/3 of the nest consists of net	1 to 5 parts per nest
2	1/3 to 2/3 of the nest consists of net 1/3	6 to 10 pieces per nest
3	> 2/3 of the nest consists of net	> 10 parts per nest

For European Shags in France, the number of litter items per nest is recorded and classified as: MD0 (no item of marine debris visible in the nest), MD1–5 (1 to 5 items identified), MD6–10, MD11–20, and MD20+ (Cadiou *et al*., 2011).

The dismantlement of nests is a destructive process, which is only practically possible on easily accessible nests. There are two main methods of assessing entanglement:

- In birds found dead on the coast (beached birds surveys).
- In connection with nest incorporation of litter at seabird colonies.

Because it is difficult to make a distinction between entanglement in active fishing gear and that in lost or discarded fishing equipment e.g. ghost nets or the remains of fishing gear, the data collected from dead beached birds is difficult to interpret. For items other than fishing gear such as strapping bands, balloon ribbons, plastic bags etc. it is more obvious that marine litter is involved, however birds, especially gulls, can also become entangled with such items outside the marine environment e.g. at landfill sites situated near to the coast. Kühn and van Franeker (2020) concluded that a systematic census in a specific area is required in order to evaluate the incidence of entanglement in regard to the total sample size, but this is usually difficult to obtain.

Systematic beached bird surveys, which document entanglement, are currently undertaken in Belgium and the Netherlands. Until now the use of beached-bird surveys for assessing the impact of marine litter has not been advocated.

The assessment of entanglement victims is integrated into the monitoring programme on nest incorporation on Helgoland, where it is clear when, where and with which object entanglement has occurred (S. Garthe and N. Guse pers. comm.). On Helgoland, monitoring of breeding success in relation to nest incorporation of litter in nests of Northern Gannets has revealed a reduction in breeding success of between 2.8–9.6 % annually, between 2015 and 2021, due to entanglement in plastics used as nesting material (data from V. Dierschke). It should be noted that species, particularly the common guillemot, breeding in close proximity to Northern gannets can also become entangled in the lengths of rope hanging down from nests.

1.3 Present coverage of studies on the seabird-litter interaction

At present most work in the Northeast Atlantic concentrates on litter registered in the gastrointestinal tracts of seabirds, although some work considers entanglement and nest incorporation of litter. In the Northeast Atlantic only one major monitoring programme, the OSPAR Litter in Northern Fulmar stomachs programme, uses standard monitoring protocols over a wide geographic scale (OSPAR 2015). This OSPAR Ecological Quality Objective has also recently been incorporated into the MSFD, with a data-derived threshold value, the Fulmar-TV, to assess whether ‘Good Environmental Status’ is achieved for criterion D10C3 (van Franeker *et al*., 2021). Given the difficulties in establishing where marine litter harms, or adversely effects, the health of a species, and to quantify this effect (Werner *et al*., 2016; 2000), an acceptable alternative was used by taking the situation in near pristine areas as a threshold value (Werner *et al*., 2020).

It is important to note that there are still challenges with using the Northern Fulmar to monitor levels of litter in the ICES/OSPAR/HELCOM region given that 1) the numbers of beached Northern Fulmars being collected is declining, which reduces the available sample size; 2) although the collection of beached Northern Fulmars from Norway is being expanded to include northern Norway, similar to other high latitude locations, long sandy beaches and people collecting beached birds are limited in these areas, which further reduces the sample sizes that can be obtained; and 3) Northern Fulmars are uncommon in the Baltic Sea and therefore a substitute species(s) are required to monitor litter ingestion in this region. Recent research identified litter ingestion by wintering seabirds in the Baltic Sea, specifically by Long-tailed Duck, Common Guillemot and Red-throated Diver (Morkūnas *et al*., 2021), which could therefore be used as potential alternatives for monitoring litter in this region.

Furthermore, the current Northern Fulmar monitoring focuses on measuring the prevalence of litter in the environment and does not provide information on the impact of litter on Northern Fulmar populations, with no evidence that current declines are related to litter ingestion.

More broadly, Kühn and van Franeker (2020) present a comprehensive and up-to date global review of studies of marine litter ingested by marine megafauna, which quantifies interactions, including entanglement and ingestion records for birds. They reported that of the 409 known seabird species, plastic ingestion has been investigated in 226 species of which 180 species were recorded to have ingested plastics. O'Hanlon *et al*. (2017) reported for the northeastern Atlantic that, there was evidence of plastic in the digestive tract of 25 of the 34 species that had been examined for plastic ingestion, however, for five of these species only single instances, involving small sample sizes were reported. In the Arctic, including Greenland, the Faroe Islands, Iceland, Russia, Finland, Sweden and Norway, a review of plastics ingestion by seabirds revealed that half of 51 seabird species examined had ingested plastics (Baak *et al*., 2020). However, limited data were available for most species, with a lack of data in the northern most areas of the region (Baak *et al*., 2020).

O'Hanlon *et al*. (2017) concluded that active interactions with marine plastic occurred across the northeastern Atlantic, but information on the extent of these interactions for specific species and locations is limited, especially with regard to nest incorporation, where only three published studies provided quantified information. Opportunistic data on nest incorporation, collected largely through routine colony visits by researchers, rangers and ringers across northwest Europe, provided additional quantified information on litter in the nests of 14 seabird species across 84 colonies (O'Hanlon *et al*., 2021). In Kühn and van Franeker (2020), entanglement was documented for 112 seabird species from a total of 409 species. Data on entanglement was reviewed by Ryan (2018), who reported that, on the basis of published records, the proportion of affected seabirds had increased from 16% of species to 25% over the last two decades. He considers the entanglement of animals to be one of the main environmental impacts of waste litter. A global review of litter in bird nests has been recently published by Jagiello *et al*. (2019) and a website was launched in 2019 offering the general public the opportunity to record cases of seabird entanglement or litter in nests (www.birdsanddebris.com).

1.4 Deficits in assessment of the seabird-litter interaction

Provencher *et al*. (2019) report on the lack of standardized methods for sample collection along with comparable processing and reporting. They write that there is a need for standardization of collection, processing, plastic quantification, and reporting in order to facilitate statistically and scientifically credible large-scale comparisons in future. They also stress the importance of standard approaches when reporting "zeroes". Kühn and van Franeker (2020) are of the opinion that standardized methods are crucial to future studies to generate datasets that allow higher level ecosystem analyses. O'Hanlon *et al*. (2017) report that in the Northeast Atlantic, for many species, sample sizes were small or not reported, and only 39% of studies were from the present century. Information from multiple countries and years was only available for 11 species. They write that the result of their review shows that very little is known about the current prevalence of plastic ingestion and nest incorporation for many species in the Northeast Atlantic, a number of which are globally threatened. Baak *et al*. (2020) stated similar observations from their review of plastic ingestion by seabirds in the Arctic. According to O'Hanlon *et al*. (2017), in most cases the metrics reported were inadequate to conduct robust comparisons among locations and species or perform meta-analyses. They recommend multi-jurisdictional collaboration to obtain a more comprehensive and current understanding of how marine litter is affecting seabirds in the northeastern Atlantic.

1.5 Recommendations for further study

The following research and monitoring recommendations have been proposed by O'Hanlon *et al*. (2017):

Research

1. If pellets are to be used in monitoring, what is the proportion of litter that remain in the gastro-intestinal tract of different pellet producing birds?
2. How does the quantity of litter detected in pellets compare with that detected through necropsy or lavage in the same species?
3. How long does litter remain in the gastro-intestinal tract of different species?
4. How are species affected by secondary ingestion of litter?
5. How are contaminants that come from plastics, or adsorbed into it, impact seabirds?

6. What impact does litter ingestion or nest incorporation have on seabirds at the organismal and ecological level?

Monitoring

1. As litter monitoring, at present, is largely opportunistic with limited coordination, a multi-jurisdictional, coordinated, collaborative effort is necessary to obtain samples required to monitor the temporal and spatial variation in litter ingestion among seabird species in the Northeast Atlantic.
2. Future studies that report litter metrics should follow the recommendations for standardization of collection, processing, litter quantification and reporting proposed by Provencher *et al*. 2017 and 2019[1].
3. When monitoring ingestion, it is important that frequency of occurrence and mass of ingested litter metrics are recorded.
4. Studies should report the minimum litter size threshold detected.
5. Diet studies, where the focus is not ingested litter, should also follow the standard recommendations, where possible.
6. Existing seabird research, monitoring and ringing activities e.g. at seabird colonies, should be used for the collection of samples using standardized protocols. Birds from seabird wrecks, birds caught in fishing gear, or which have died under other circumstances, should also be exploited.
7. Opportunities for all species should be exploited, with emphasis on the species for which very little current information is available (see Table 1.2), and especially those at higher risk and from underrepresented locations.
8. Methods that allow for frequent collection of a large number of samples from multiple species and locations will be necessary to obtain sufficient samples for statistical analysis e.g. of potential trends.
9. A standardized protocol should be established for the documentation of litter incorporated in the nests of surface-nesters across the Northeast Atlantic. This could include citizen-science approaches[2].
10. A standardized protocol for recording entanglement in nest material at seabird colonies should be established[3].

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[1] Provencher *et al*. (2017) suggest best practices for categorizing debris and reporting results. Provencher *et al*. (2019) present detailed descriptions of procedure for all stages of analysing litter contents of the gastro-intestinal tract, boluses and regurgitates. Explaining the pros and cons of different methods in relation to the metrics of interest. They present the key metrics to measure and report in plastic ingestion studies (Species, age, sex, body condition metrics, cause of mortality, report zeros, breeding stage).

[2] See O'Hanlon *et al*. (2019) and Galgani *et al*. (2013). A standardized approach should also indicate what to record when a nest is built within a litter item such as a plastic box, especially where no other litter items are recorded in the nest.

[3] S. Garthe and N. Guse pers. comm. Of the research and monitoring recommendations highlighted above, a key priority, especially in relation to the MSFD assessment criteria is to quantify the adverse effects of litter interactions on species. This requires feasible methods to measure population level effects of litter on seabird species, for example, determining the adverse effects of litter interactions, such as ingested plastic loads, on survival and productivity, incorporating both lethal and sublethal effects. In terms of monitoring, two recent reports have been published identifying recommendations and proposals to monitor plastic pollution and seabirds, focused on Norway and the Arctic (Baak *et al*., 2021; Dehnhard *et al*., 2019). Table 1.3 provides an overview of a sample of current approaches/schemes for monitoring interactions between litter and seabirds across the OSPAR/ICES/HELCOM regions. Recommendation for monitoring from other regions and species will also be useful in achieving standardization across research and monitoring programs (Claro *et al*., 2019; Savoca *et al*., 2022). That the origins of beached birds used to monitor litter ingestion cannot be currently identified also impedes the ability to understand population effects: although there are new techniques that might help in identifying the origins of beached birds, for example, through genetics. This may also help determine the extent of mixing among populations at different spatial scales, and to help identify locations where individuals are consuming

11. To ensure these data are widely available to allow comparison across species, time, and space, all these data should be collated in a global database such as LITTERBASE (litterbase.awi.de), which should also include standardized data collected through routine seabird monitoring that has not been published in the literature.

litter. Given that litter can travel far from its origin, identifying the source of litter that seabirds are interacting with is also challenging. Plastic dispersal models provide one option to help identify the source of litter at specific locations.

Table 1.2. Species categorized by the spatial and temporal ingested plastic data that are available within the NE Atlantic. (Table 1 modified from O'Hanlon *et al*. (2017).

Species with ingested plastic data reported from multiple countries and years	Species with ingested plastic data reported from multiple countries or years	Species with single reports of ingested plastic	Species currently with no reports of ingested plastic
Northern Fulmar (*Fulmarus glacialis*)	Manx Shearwater (*Puffinus puffinus*)	Red-throated Loon (*Gavia stellata*)	Arctic Loon (*Gavia arctica*)
Great Cormorant (*Phalacrocorax carbo*)	European Storm-petrel (*Hydrobates pelagicus*)	Common Loon (*Gavia immer*)[a]	Yellow-billed Loon (*Gavia adamsii*)
Common Eider (*Somateria mollissima*) [a]	Northern Gannet (*Morus bassanus*)	Great Shearwater (*Ardenna gravis*)[b]	Zino's Petrel (*Pterodroma madeira*)[b]
Black-headed Gull (*Larus ridibundus*)	European Shag (*Phalacrocorax aristotelis*)	Sooty Shearwater (*Ardenna grisea*)[b]	Cape Verde Petrel (*Pterodroma feae*)[b]
Lesser Black-backed Gull (*Larus fuscus*)	King Eider (*Somateria spectabilis*)[a]	Leach's Storm-petrel (*Hydrobates leucorhous*)	Cory's Shearwater (*Calonectris borealis*)[b,c]
European Herring Gull (*Larus argentatus*)	Great Skua (*Catharacta skua*)	Pomarine Jaeger (*Stercorarius pomarinus*)[a]	Balearic Shearwater (*Puffinus mauretanicus*)[b]
Black-legged Kittiwake (*Rissa tridactyla*)	Mew Gull (*Larus canus*)	Arctic Jaeger (*Stercorarius parasiticus*)	Wilson's Storm-petrel (*Oceanites oceanicus*)[b]
Thick-billed Murre (*Uria lomvia*)	Great Black-backed Gull (*Larus marinus*)	Long-tailed Jaeger (*Stercorarius longicaudus*)[a]	Steller's Eider (*Polysticta stelleri*)
Black Guillemot (*Cepphus grylle*)	Iceland Gull (*Larus glaucoides*)	Sabine's Gull (*Xema sabini*)[a]	Harlequin Duck (*Histrionicus histrionicus*)
Little Auk (*Alle alle*)	Glaucous Gull (*Larus hyperboreus*)[a]	Arctic Tern (*Sterna paradisaea*)[a]	Long-tailed Duck (*Clangula hyemalis*)
Atlantic Puffin (*Fratercula arctica*)	Ivory Gull (*Pagophila eburnea*)[a]		Common Scoter (*Melanitta nigra*)
	Common Murre (*Uria aalge*)		Surf Scoter (*Melanitta perspicillata*)[b]
	Razorbill (*Alca torda*)		Velvet Scoter (*Melanitta fusca*)
			Red-breasted Merganser (*Mergus serrator*)
			Common Goldeneye (*Bucephala clangula*)
			Red-necked Phalarope (*Phalaropus lobatus*)
			Red Phalarope (*Phalaropus fulicarius*)
			Mediterranean Gull (*Larus melanocephalus*)
			Little Gull (*Hydrocoloeus minutus*)
			Ross's Gull (*Rhodostethia rosea*)
			Bonaparte's Gull (*Larus philadelphia*)[b]
			Yellow-legged Gull (*Larus michahellis*)[b]

Species with ingested plastic data reported from multiple countries and years	Species with ingested plastic data reported from multiple countries or years	Species with single reports of ingested plastic	Species currently with no reports of ingested plastic
			Caspian Gull (*Larus cachinnans*)b
			Thayer's Gull (*Larus thayeri*)b
			Common Gull-billed Tern (*Gelochelidon nilotica*)b
			Caspian Tern (*Hydroprogne caspia*)b
			Sandwich Tern (*Thalasseus sandvicensis*)
			Roseate Tern (*Sterna dougallii*)
			Common Tern (*Sterna hirundo*)
			Little Tern (*Sternula albifrons*)
			Whiskered Tern (*Chlidonias hybrida*)b
			Black Tern (*Chlidonias niger*)
			White-winged Tern (*Chlidonias leucopterus*)b

a Species where studies looked for plastic (or noted it in other species within the same study) but no evidence of plastic ingestion was observed.
b Indicates migrant species.
c Indicates species occurring in low numbers but where plastic ingestion is studied outside the north-eastern Atlantic.

Table 1.3. Overview of a sample of current approaches/schemes for monitoring interactions between litter and seabirds across the OSPAR/ICES/HELCOM regions.

Country / region	Ingestion	Entanglement
Belgium	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	Beached Bird Surveys
Denmark (North Sea)	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	
Estonia		A pilot study regarding marine litter was carried out in coastal islands 2019–2020, entanglement (none) and use of litter in nests (about 10%) were observed. Bird counting is conducted in up to 100 islands per year, there is possibility to use this as a starting point and add monitoring programs related to marine litter.
Germany	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	Monitoring of Northern Gannets on Helgoland (S. Garthe and N. Guse pers. Comm.)
Finland		Pilot of monitoring debris in Great Cormorant nests
Ireland	Ingestion recorded by the Republic of Ireland Beached Bird Survey	
Lithuania	2021 paper documenting ingestion of litter by seabirds wintering in the Baltic Sea (Morkūnas *et al*., 2021)	
Netherlands	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	Beached Bird Surveys
Norway	In the process of starting a long-term monitoring programme (Dehnhard *et al*., 2019) Contributes to OSPAR Plastic Particles in Fulmar Stomachs	SEAPOP Network collected data on nest incorporation of litter and entanglement at the nest (2018–2020, O'Hanlon *et al*., 2021)
UK	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	Records of entangled Northern Gannets on annual visits to Grassholm Volunteers of the recent national seabird census (2016–2021) were encouraged to record litter in seabird nests and entanglement at the nest where possible (O'Hanlon *et al*., 2021)
France	Contributes to OSPAR Plastic Particles in Fulmar Stomachs	Monitoring of litter in European Shag nests (visual observation) since 2010 (Cadiou and Fortin, 2015) - Indicator under development to determine good environmental status for National QSR. Monitoring of Northern Gannets in Sept Iles. Beached Bird Surveys – but project abandoned as too difficult to really identify entanglement as cause of death

1.6 References

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2 Marine bird assessments for OSPAR QSR 2023: indicators

Following its Quality Status Report 2010 (QSR 2010) and Intermediate Assessment 2017 (IA 2017), OSPAR is assessing the status of the North-East Atlantic in its Quality Status Report 2023 (QSR 2023). The assessment of biodiversity is supported by the assessment of marine birds, first by applying indicators (this section) and second by the integration of indicator assessments to species and species group assessments, which are part of a thematic assessment of marine birds (Section 3). In addition to QSR 2023, the indicators serve the Article 8 status assessments according to the Marine Strategy Framework Directive (MSFD), i.e. the Member States of the European Union can use the indicator outcomes for their national reporting of the state of their marine waters.

The development of indicators is an ongoing process conducted by JWGBIRD and its predecessors as well as nominated indicator leads from OSPAR Contracting Parties. This work is arranged along Descriptor 1 (biodiversity) of the EU Marine Strategy Framework Directive (MSFD) and aims to inform five criteria: bycatch (D1C1), abundance (D1C2), demography (D1C3), distribution (D1C4) and habitat (D1C5). In QSR 2010, no indicator assessment was available, but the marine bird assessment in IA 2017 was built on two indicators covering abundance and demography (breeding success / failure), while three more indicators were used in the MSFD assessment of the UK only (Table 2.1). For QSR 2023 the aim was to base the assessment on more indicators. Therefore, JWGBIRD continued to develop new indicators and refine the existing ones. The 2021 annual meeting of JWGBIRD took place during the period in which the deadline for submitting the data had already expired, but no evaluation could yet take place due to late data delivery. As no evaluation results were available yet, only a brief report on the status of indicator development is given here.

Table 2.1. Overview of OSPAR marine bird indicators used in IA 2017 and envisaged to be used in QSR 2023.

MSFD criterion	Indicator name	Status	Recent development
D1C1 (bycatch)	B5 Marine bird bycatch	Candidate Indicator	No assessment in IA 2017 Development according to results of OSPAR-HELCOM Workshop (2019, currently worked on in BLUES Same approach as HELCOM bird abundance indicators Pilot assessment for seabirds wintering offshore (based on at-sea surveys) envisaged for QSR 2023
D1C2 (abundance)	B1 Marine bird abundance	Common Indicator	Assessment in IA 2017 Development of baseline setting and assessment value Full assessment envisaged for QSR 2023 Offshore: pilot assessment for part of the North Sea envisaged for QSR 2023
D1C3 (demography)	B3 Marine bird breeding productivity	Common Indicator	Assessment in IA 2017

MSFD criterion	Indicator name	Status	Recent development
			Completely new design based on population models Full assessment envisaged for QSR 2023
	B2 Breeding success of kittiwakes	Candidate Indicator	Assessment in parallel with IA 2017 (UK only) Not included in QSR 2023
D1C4 (distribution)	B6 Distribution of marine birds	Candidate Indicator	Assessment in parallel with IA 2017 (UK only) Not included in QSR 2023
D1C5 (habitat for the species)	B7 Marine bird habitat quality	New Indicator	Pilot assessment envisaged for QSR 2023
	B4 Non-native/invasive mammal presence on island seabird colonies	Candidate Indicator	Assessment in parallel with IA 2017 (UK only) Not included in QSR 2023

While the development and the assessment of the breeding productivity indicator was part of the EU-funded *North East Atlantic project on biodiversity and eutrophication assessment integration and creation of effective measures* (NEA PANACEA), most of the work was funded by the indicator lead countries UK (B1, B3), Germany (B1, B3, B5, B7) and Norway (B5). In addition, work on the bycatch indicator B5 was financially supported by the UK.

2.1.1 Marine bird abundance

In principle, the concept of this indicator for the abundance of breeding and non-breeding marine birds was maintained. The indicator metric is *relative abundance*, which is annual abundance expressed as a percentage of the baseline:

relative abundance = annual abundance / baseline abundance

Refinement was done in baseline setting and assessment value. While in IA 2017 the abundance as of 1992 was used as the baseline, in QSR 2023 the baseline is the calculated value for 1991 derived from a significant trend over the years 1991–2000 (in the absence of a significant trend, the mean abundance 1991–2000 is used as baseline). In IA 2017, only the last abundance value of the time-series was used as assessment value. In contrast, the assessment value in QSR 2023 is the mean abundance of the last six years in the time-series. The threshold value remained unchanged and is set at 70% of the baseline value (80% in species laying only one egg per year). See Figure 2.1 for an example.

Missing annual observations in the time-series of species/sites were interpolated using General Additive Models (GAMs; Ward *et al.*, 2014), replacing the modified chain approach developed by Thomas (1993) that was used during the IA 2017 for imputation of missing data.

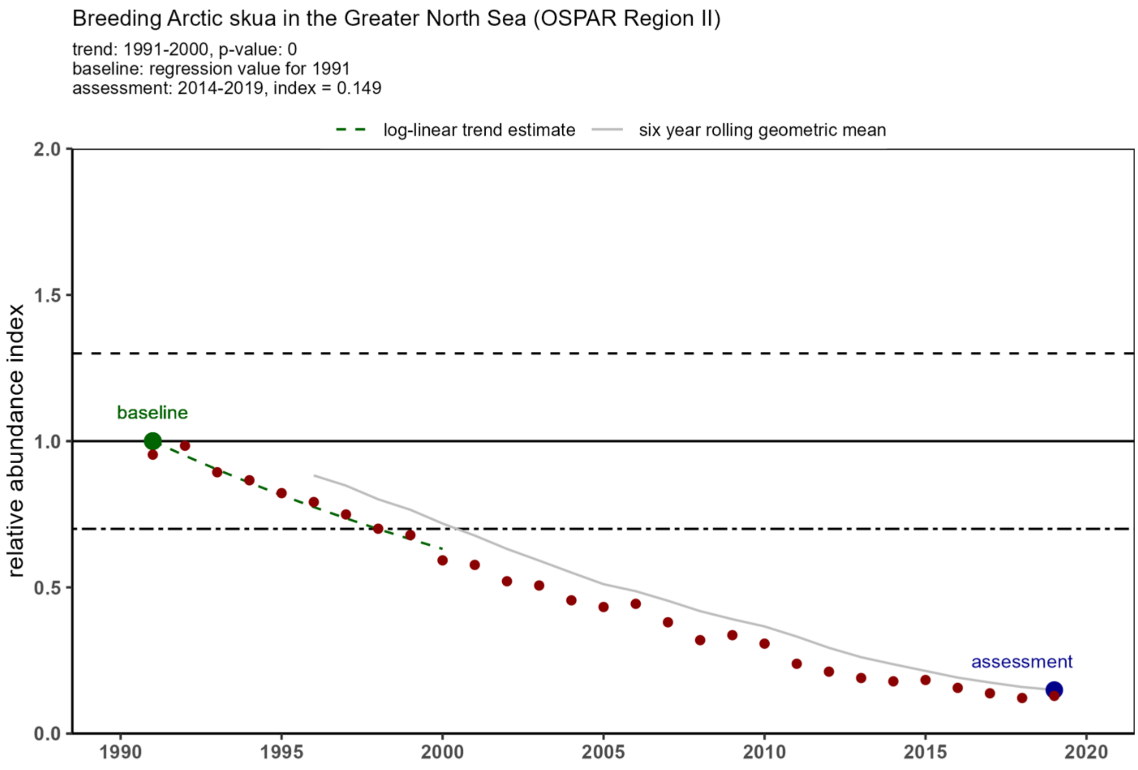

Figure 2.1. An example of species-specific trend of the B1 indicator. The figure shows temporal trends in relative abundance of the Arctic Skua in the Greater North Sea obtained from breeding data. Datapoints represent yearly relative abundance values and the grey line represent the six-year rolling relative abundance geometric mean. The black line indicates the baseline which is calculated from the regression over the first ten years of data (broken green line). The black dotted line indicates the lower threshold value of 0.7 (for species that lay >1 egg) or 0.8 for species that lay 1 egg only); the black dashed line indicates the upper threshold value of 1.3. In this example, the value obtained from the last six years of the time-series is below the baseline, meaning that the species has failed the threshold value.

The assessments for breeding and non-breeding marine birds are conducted on the geographic level of OSPAR Regions, with Region II (Greater North Sea) also assessed in six subdivisions and Region I (Arctic Waters) only covering the Norwegian part (Figure 2.2).

For the first time, QSR 2023 will see an assessment for wintering birds offshore, based on data from ship-based and aerial surveys. A pilot assessment was conducted for seven species wintering in the North Sea sections of Belgium, the Netherlands and Germany. In principle, the approach is very much the same as for breeding birds and birds counted from the shore in winter, also using relative abundance as a metric. The offshore survey data are analysed using species-distribution Generalized Additive Models (sdGAM), which are described by Mercker *et al.* (2021a).

Baseline values were obtained based on predictions using the appropriate log-linear respective yearly trend model for the first ten years of the observed period (1991–2000). All p-values and confidence intervals were calculated based on resampling techniques of posterior distributions of model-parameters as described in Wood (2017). In case of a significant regression over these ten years, the predicted value for the first year (1991) was used as the baseline value, otherwise the mean of the first ten years served as baseline value. The mean of the last six years (2015–2020) was assessed against threshold value for good status which is 70% of the baseline value (80% in species laying only one egg per year).

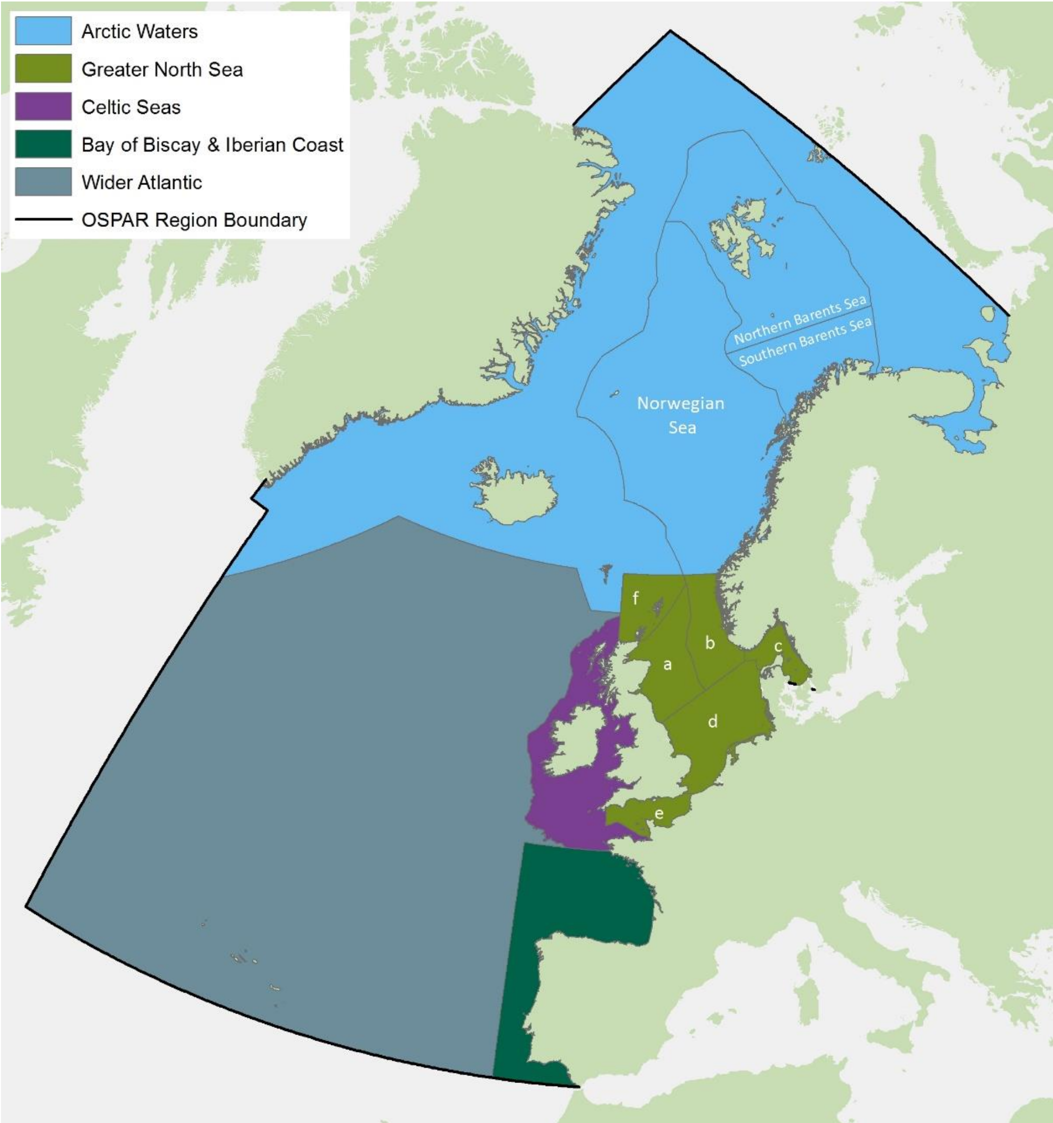

Figure 2.2. Marine bird assessment units. The Greater North Sea is subdivided into a) Northeast coast of Britain, b) West coast of Norway, c) Skagerrak and Kattegat, d) Southern North Sea, e) English Channel, f) North coast of Scotland and the Northern Isles.

2.2 Marine bird breeding productivity

Since 2018, JWGBIRD has been developing the OSPAR common indicator B3 "Marine bird breeding success/failure" (ICES 2018). It was found that the proportion of failing breeding colonies in a given number of years is not adequately reflecting the state of a species, not least because threshold values were arbitrarily set. Still using the same kind of breeding productivity data but approaching the consequences of productivity levels for species status differently the new approach directly tests what impact observed breeding success has on population growth rates. The expected growth rates are projected into the future (three times generation length, variable among species). The threshold for good status is set at the species-specific growth rate which would cause a population decline of 30% over the next three generation, assuming an average breeding productivity as observed in the last six years of the time-series, but also using other demographic data (including mortality rates) from literature and trends in population size from the abundance indicator. The threshold value is based on the IUCN red list criterion that a population is "Vulnerable" if the decline in population size exceeds 30% over three generations (IUCN 2012). For more details see the former description of this approach (ICES 2020).

Indicator B3 is assessed on the geographic level of OSPAR Regions only.

2.3 Marine bird bycatch

Following recommendations from the joint *OSPAR-HELCOM workshop to examine possibilities for developing indicators for incidental bycatch of birds and marine mammals* (September 2019, Copenhagen, OSPAR and HELCOM 2019), an indicator for assessing of marine bird bycatch in fisheries was developed in parallel with the bird section of the HELCOM core indicator *Number of drowned mammals and waterbirds in fishing gear*. Wherever possible, a population modelling approach (Population Viability Analysis, PVA) shall be used for all species potentially taken as bycatch, provided that the necessary data on fishing effort, bycatch rates and demography of bird species are available at population level (Assessment Method 1).

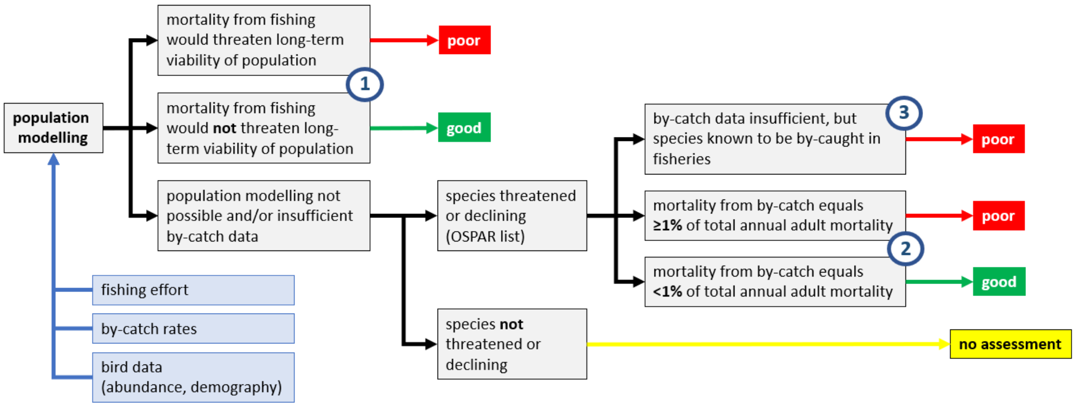

Figure 2.3. Workflow for the candidate indicator B5 Marine Bird By-catch. Numbers indicate where the Assessment Methods 1, 2 and 3 are applied.

If Assessment Method 1 is not applicable due to lacking data, then Assessment Methods 2 and 3 can be used alternatively, but only for species on the *OSPAR list of threatened and declining species and habitats*. If bycatch rates are available and total numbers of birds taken as bycatch can be calculated by the help of fishing effort data for a given assessment unit, the threshold value for good status is that the number of taken as bycatch birds does not exceed 1% of annual adult mortality. This species-specific threshold value of Assessment Method 2 (*TV(2))* is estimated from multiplying the number of birds in the assessment area *N* with the species-specific annual adult mortality rate *m* and 1%:

$$TV(2) = N * m * 0.01$$

If either bycatch rates or fishing effort data are lacking and prevent the application of Assessment Method 2, then a threatened or declining species from the OSPAR list is considered not achieving good status if its distribution is spatio-temporally overlapping with the exercise of a fishing method known to cause bycatch in that species. This threshold is an approximation of the assumption that bycatch of a species occurs.

For OSR 2023 the three Assessment Methods were tested for the following cases:

- Assessment Method 1: Cory's shearwater (OSPAR Region IV), common guillemot (Region III),
- Assessment Method 2: roseate tern (Regions II, III, V), Barolo shearwater (Region V),
- Assessment Method 3: Steller's eider (Region I).

2.4 Marine bird habitat quality

Habitat for the species is an MSFD criterion not addressed in earlier OSPAR waterbird assessments. JWGBIRD has started to develop an indicator in which the quality of waterbird habitat is measured as the degree of disturbance from human activities taking place at sea.

The assessment method was developed for both the Baltic Sea and the Northeast Atlantic and for testing was applied to the German section of the Baltic Sea and the Belgian-Dutch-German part of the North Sea. The method includes as a first step to use offshore bird survey raw data, the same as used in the offshore extension of the abundance indicator for wintering waterbirds (see 2.1), to predict the quantitative distribution of waterbirds across the assessment area by the help of species-distribution Generalized Additive Models (sdGAM). Covariates describing environmental characteristics (in the first test run: distance to coast, water depth) and human activities (nearest distance to offshore wind farms, ship density, intensity of bottom-trawl fishery) were used to explain the observed bird distribution (disturbed scenario). Then, the bird distribution as it would be without the effects of the human activities was predicted, again by the help of sdGAM models (undisturbed scenario). Comparing both scenarios gave the relative difference in abundance for each 1x1 km grid cell in the assessment unit, but that did not account for absolute differences in abundance occurring across the entire area (because birds always have places where they aggregate and where they do not occur). Therefore, the relative difference between the scenarios was weighted for the abundance by multiplying the local undisturbed abundance X (scaled from 0 to 1 for all values observed in the study area) by the strength of human pressure-related decline ($Y = 1$ equals 100% decline, $Y = 0.5$ equals 50% decline, $Y = 0$ equals 0% decline, and $Y < 0$ equals an increase due to human activities). This gave the metric D_{local}, which shows the effect of activities for each 1x1 km grid cell:

$$D_{local} = XY$$

An example map for D_{local} values of wintering common guillemots in the southern North Sea is shown in **Figure 2.3**. Next, the metric D_{global} sums up all negative effects as

$$D_{global} = \frac{\sum_{i \in A}(X_i \times \max(0, Y_i))}{\sum_{i \in A} X_i}$$

where D_{global} is weighted by the local abundance, i.e. grid cells with high local abundance influence this measure more strongly than areas with low abundance. In particular, i is an index referring to all 1 x 1 km grid cells throughout the study area A. Importantly, the above formula means that grid cells with zero abundance are not considered, because when $X = 0$, the product also becomes 0. Grid cells with low abundances thus only have a minor influence on D_{global}. Notably, this metric (in contrast to D_{local}) only considers negative effects (i.e. avoidance and not attraction) of human activities. This is accounted for by considering $max(0, Yi)$ instead of Yi, such that in the event of negative Yi-values (i.e. local abundance increases due to human activities), 0 is considered instead. The D_{global} value expresses which proportion of the birds in the assessment area are disturbed by the activities. An overview of the overall approach is given in Figure 2.4, and more details are available from Mercker *et al*. (2021b).

The assessment method was presented and discussed in a JWGBIRD workshop on 3 November 2020, which was held online due to Covid19 restrictions. The approach was generally appreciated, though it was criticized that variables explaining the habits of the birds, especially those explaining food availability are lacking. This was taken account for in an updated version of the indicator, which was tested for six marine bird species in the southern North Sea. As proxies for food supply Chlorophyll a concentration and sea surface temperature were included as additional covariates, and this reduced uncertainties in the results compared to the initial analyses.

The pilot assessment for six species in the southern North Sea was adopted by BDC 2022-1. The results shall be reported in the Thematic Assessment but will not be integrated with the assessments on abundance and breeding productivity.

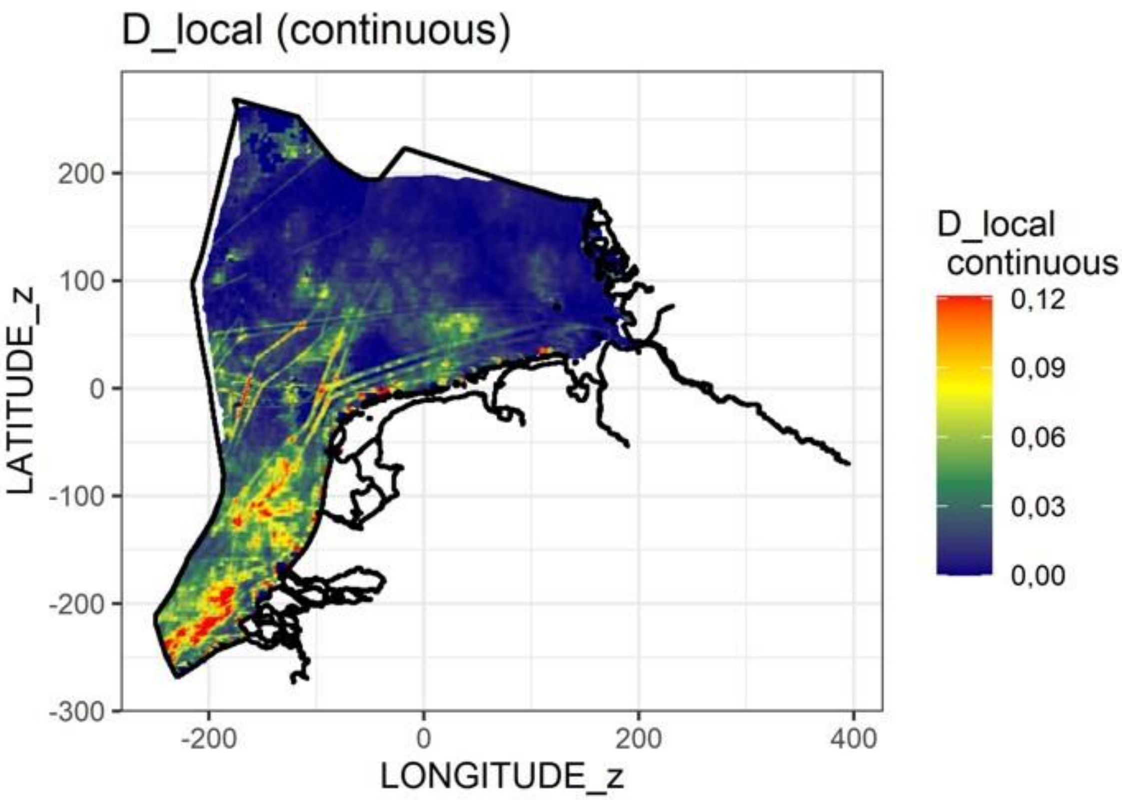

Figure 2.3. Distribution of D_{local} values expressing the degree of disturbance of common guillemots from human activities across the North Sea sections of Belgium, the Netherlands and Germany. The higher the D_{local} value is, the stronger is the displacement compared to an undisturbed scenario. Negative values indicate attraction caused by human activities.

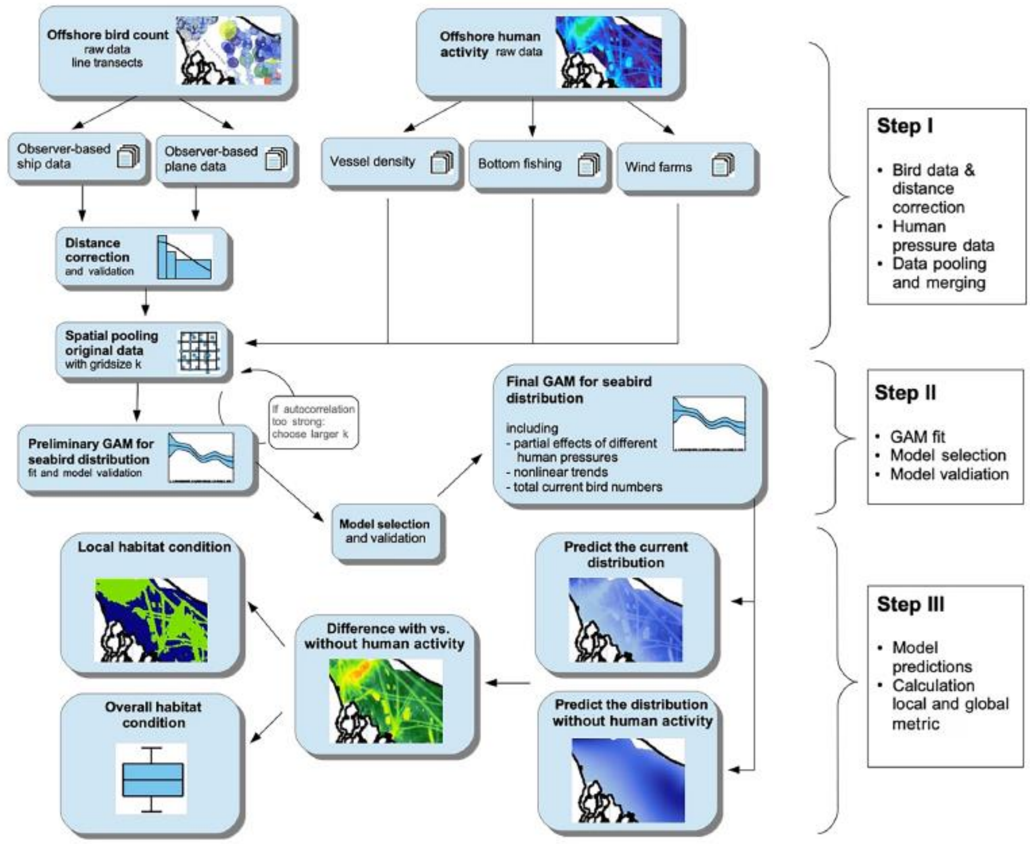

Figure 2.4. Sketch of the analyses from raw offshore bird survey data and human pressure data via regression models to local and global metrics of waterbird habitat disturbance (taken from Mercker *et al*., 2021b).

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3 Marine bird assessments for OSPAR QSR 2023: thematic assessment

By the help of its Quality Status Report 2023 (QSR 2023), OSPAR aims to assess the environmental status of the Northeast Atlantic against the objectives of the Northeast Atlantic Environmental Strategy 2010–2020 (NEAES 2020), to evaluate any updated or additional objectives from NEAES 2020–2030, and identify the priority elements for actions to achieve OSPAR's objectives for a clean, healthy, biologically diverse sea, used sustainably. As part of the marine environment, the assessment of birds contributes to the knowledge of quality status of the five OSPAR Regions. The QSR 2023 Guidance Document (OSPAR Agreement 2019-02) gives advice how assessments shall be structured and produced (Figure 3.1).

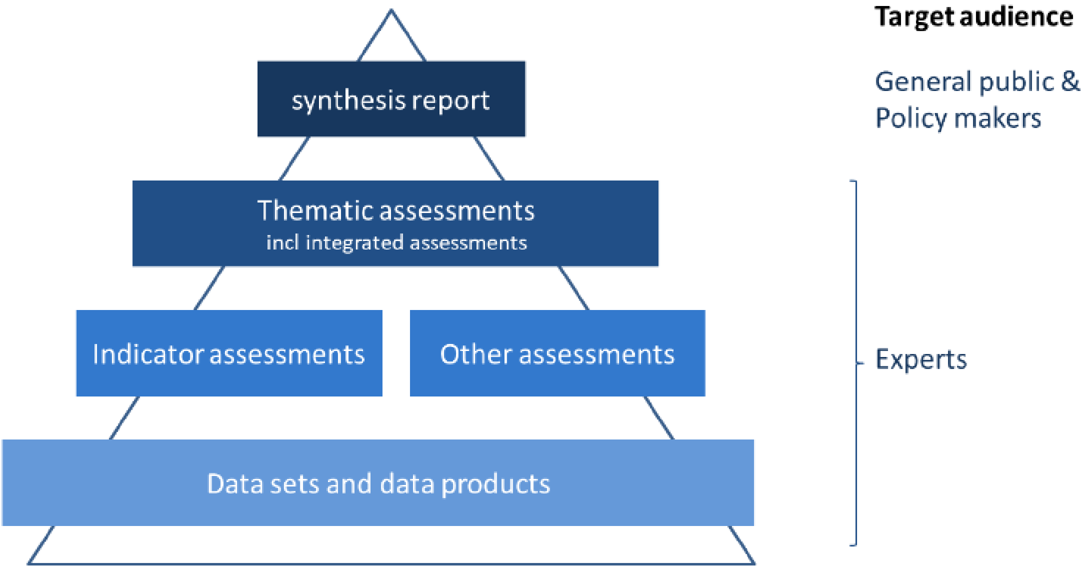

Figure 3.1. Structure of the OSPAR Quality Status Report 2023.

Based on the indicator assessments (see section 2) and added by some assessments of threatened and declining species conducted under ICG-POSH, the status of marine bird species groups feeds into the Marine Bird Thematic Assessment. The function of thematic assessments is to combine an integrated assessment of the status of marine birds with other relevant information causing the status and deriving from it. All information shall be aligned to a DAPSIR framework (Figure 3.2), where the capital letters stand for the chapters about the social and economic Drivers for human Activities, which cause Pressures on marine birds. Pressures have impact on the State of marine birds, and the state has Impact on the ecosystem services of the birds. Finally, there is Response to state and its changes in the form of measures.

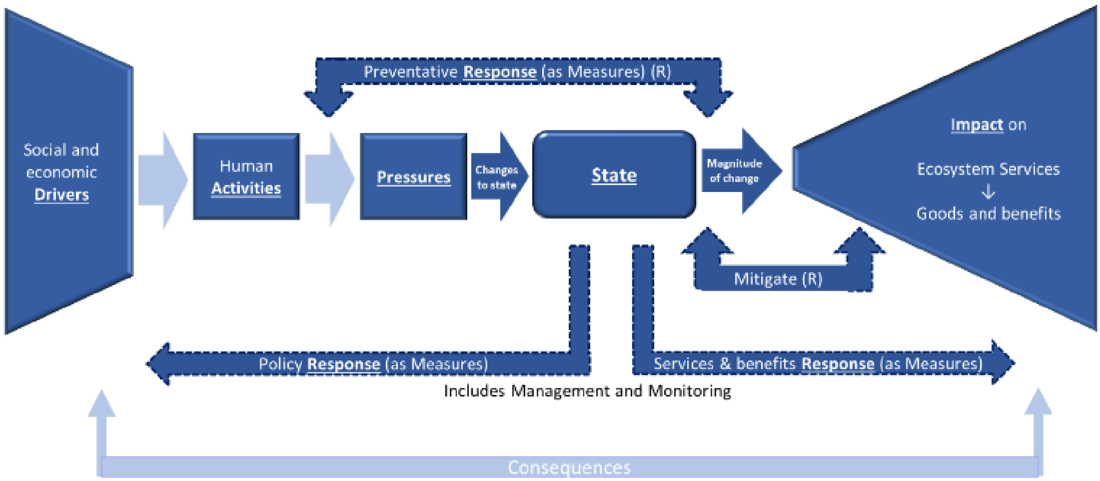

Figure 3.2. Framework to underpin thematic assessments, using the DAPSIR approach.

These chapters focus on the quality status of the Northeast Atlantic and its Regions for marine birds, the extent to which (quality) objectives and/or (management) targets have been achieved in the OSPAR Regions and trends or the direction of change for each of the aspects. The connections between the elements of the individual chapters are shown by the help of a bow-tie-analysis. A separate section is dedicated to effects of climate change.

The State chapter brings together the indicator results to assess the status of species and species groups. This integrated assessment shall follow the integration methods developed by JRC (Dierschke *et al.*, 2021) and are included in the Article 8 MSFD Assessment Guidance (European Commission 2022). Thus, conditional rules will be applied to assess the status of species based on the indicator results. The integration from species-to-species group will follow the proportional that a species group is in good status if at least 75% of the species are in good status.

The assessment needs to be finalized by late October 2022, following review by OSPAR ICG-COBAM and BDC. It will be published online in 2023.

3.1.1 References

European Commission 2022. MSFD CIS Guidance Document No. 19, Article 8 MSFD, May 2022. https://circabc.europa.eu/d/d/workspace/SpacesStore/d2292fb4-ec39-4123-9a02-2e39a9be37e7/GD19%20-%20MSFDguidance_2022_Art.8Assessment(1).pdf

Dierschke V., Kreutle A., Häubner N., Magliozzi C., Bennecke S., Bergström L., Borja A., Boschetti S.T., Cheilari A., Connor D., Haas F., Hauswirth M., Koschinski S., Liquete C., Olsson J., Schönberg-Alm D., Somma F., Wennhage H. and Palialexis A. 2021. Integration methods for Marine Strategy Framework Directive's biodiversity assessments. EUR 30656 EN, Publications Office of the European Union, Luxembourg. https://op.europa.eu/en/publication-detail/-/publication/a4d8c685-a3da-11eb-9585-01aa75ed71a1/language-pl

4 Marine bird assessments for HELCOM HOLAS 3: indicators

HELCOM conducts holistic assessments (HOLAS) to give comprehensive overviews of the ecosystem health of the entire Baltic Sea. The assessments inform the Baltic Sea Action Plan (BSAP), which was updated recently (HELCOM 2021). They also assist the environmental managers and decision-makers in the Baltic Sea Region, allowing them to base their work on sound, up-to-date knowledge of the status of the sea. The third holistic assessment (HOLAS 3) is covering the period 2016–2021 and is expected to be published in May 2023.

The status of waterbirds feeds into the assessment of biodiversity. Waterbirds are assessed by the help of indicators, which on the one hand were successfully applied already in the preceding holistic assessment (HOLAS 2, HELCOM 2018a), but on the other hand are currently under development.

Core indicators are available for breeding and wintering waterbirds, and for HOLAS 3 an extension of the indicator for wintering birds to offshore areas (based on aerial and ship-based offshore surveys) is envisaged. The core indicator about bycatch is currently re-designed in the frame of the HELCOM BLUES project task 2.1. Biodiversity, Litter, Underwater noise and Effective regional measures for the Baltic Sea. New indicators are being developed for the breeding success of waterbirds and for the habitat quality as expressed in terms of disturbance from human activities. The latter was not accepted by one HELCOM Contracting Party and therefore only feeds HOLAS 3 with factual information about disturbance from activities. Table 4.1 provides an overview of the waterbird indicators informing HOLAS 3 and their current status.

All indicators are developed in collaboration with JWGBIRD. Therefore, indicators in HELCOM and OSPAR are quite similar in their design, leading to well comparable assessments across the marine areas of these to Regional Sea Conventions. At the same time, the indicators are constructed in a way allowing EU Member States to use the outcomes for their national Article 8 reporting under MSFD.

The timeline for all indicators is that the HOLAS 3 datacall ends on 31 May 2022. Indicator results shall be ready by 31 August 2022, and indicator reports need to be submitted to HELCOM STATE and CONSERVATION by 17 October 2022. Before this submission, JWGBIRD experts will be asked to review the draft indicator reports.

Here, the development of indicators for HOLAS 3 is shortly described on the basis of their state by early 2022. Indicator development and eventually the assessment are ongoing processes, therefore this section can only provide a snapshot.

Table 4.1. Overview of HELCOM waterbird indicators envisaged to be used in HOLAS 3. There is currently no indicator for the MSFD criterion D1C4 (distribution).

MSFD criterion	Indicator name	Status	Recent development
D1C1 (bycatch)	Number of drowned mammals and waterbirds in fishing gear	Core Indicator	Development according to results of OSPAR-HELCOM Workshop (2019, currently worked on in BLUES Same approach as OSPAR Candidate Indicator B5 Pilot indicator assessment and risk-mapping envisaged in BLUES)

MSFD criterion	Indicator name	Status	Recent development
D1C2 (abundance)	Abundance of waterbirds in the breeding season	Core Indicator	No change compared to HOLAS II
	Abundance of waterbirds in the wintering season	Core Indicator	Coastal birds: no change compared to HOLAS II Offshore: assessment for the first time, species and areas according to data delivery
D1C3 (demography)	Waterbird breeding success	Candidate Indicator	Same approach as OSPAR Common Indicator B3 Pilot assessment envisaged at least for common guillemots of Stora Karlsö
D1C5 (habitat for the species)	Waterbird habitat quality	Factual information	Same approach as OSPAR Candidate Indicator B7 Pilot assessment done for German Baltic Sea (2 species)

4.1 Abundance of waterbirds

In the HELCOM waterbird assessments, abundance is addressed by two indicators – one for breeding birds and one for wintering birds. They both follow the same approach by assessing the mean abundance index for the years of the assessment period (usually the last six years in the time-series) against the threshold, which is defined as 70% of the baseline abundance (80% in species laying only one egg per year). The baseline is the mean of the index values of the first ten years of the time-series (1991–2000). This concept was implemented in HOLAS 2 (HELCOM 2018b,c) and will be kept for HOLAS 3.

The indicator about the abundance of wintering waterbirds was confined to coastal birds, counted during land-based surveys during the International Waterbird Census (usually mid-January). Therefore, a number of waterbird species ranging off the coast could not be assessed – namely seaducks, divers and auks. Meanwhile, most countries at the Baltic Sea run a monitoring with aerial and/or ship-based offshore surveys or at least do so in the frame of dedicated projects (ICES 2020). In winter 2015/16, there was a coordinated survey across much of shallow water areas, which hold the great majority of staging seaducks and divers during this particular season (ICES 2020). Based on the data of these offshore surveys a pilot assessment is envisaged for including waterbirds wintering offshore to supplement the assessment of birds counted from the coast.

A method to predict quantitative waterbird distribution by the help of generalized additive [mixed] models (GA[M]M) has been developed since the HOLAS 2. This method was first applied to marine birds in the German North Sea (Mercker *et al*., 2021a) and is currently used in a pilot assessment for the Belgian-Dutch-German North Sea in OSPAR’s marine bird abundance indicator (see section 2.1). Further, for species wintering both at the coast and offshore, a method is available to combine the partial results by weighting for the proportion of individuals in a population wintering at the coast and offshore, respectively (ICES 2016; Mercker *et al*., 2021a). If the pilot assessment is successful, the waterbird abundance assessment of HOLAS 3 can go beyond the coastline and include the open sea.

The offshore extension of the winter abundance indicator has relevance for a number of species included in the Red List of *HELCOM Red List of Baltic Sea species in danger of becoming extinct*: red-throated diver, black-throated diver, red-necked grebe, Slavonian grebe, common eider, Steller's eider, long-tailed duck, common scoter, velvet scoter, red-breasted merganser, little gull, black-legged kittiwake and black guillemot (HELCOM 2013).

4.2 Breeding success of waterbirds

Breeding productivity has been identified by JWGBIRD to have high explanatory power regarding the status of marine bird species. It points to problems for breeding birds immediately rather than after only a couple of years in the abundance indicator, which is reacting more slowly on environmental changes. HELCOM waterbird assessments so far have not covered this criterion but aspires to include such information into future assessments. For HOLAS 3 it is envisaged to conduct a pilot assessment for common guillemots from Stora Karlsö (Sweden), the by far largest colony of that species in the Baltic Sea. This pilot assessment will build on the OSPAR common indicator B3 Marine Bird Productivity, which was developed in JWGBIRD (ICES 2020) and is currently applied to many species across the OSPAR Region in the frame of QSR 2023 (see Chapter 2.2). In HELCOM, this indicator is named *Breeding success of waterbirds*.

In future, JWGBIRD needs to explore where data on breeding success are recorded and could be used for this indicator. Further, Contracting Parties should explore possibilities to monitor breeding success in the waterbird species reproducing in their country.

4.3 Bycatch of waterbirds in fisheries

In HOLAS II, the indicator *Number of drowned mammals and waterbirds in fishing gear* could not be applied due to the lack of data on bird bycatch and fishing effort (HELCOM 2018d). Rather, the possible application was shown by the help of old data published for a few species. However, meanwhile the assessment method using Potential Biological Removal (PBR) turned out to be unsuitable for birds (O'Brien *et al*., 2017; Marchowski *et al*., 2020). Therefore, the indicator was completely redesigned, based on the outcome of the *OSPAR-HELCOM workshop to examine possibilities for developing indicators for incidental bycatch of birds and marine mammals* held in Copenhagen in 2019. The development has been carried out under the EU-funded HELCOM BLUES project (Task 2.1.2), and the concept of the indicator has been aligned to the sister indicator B5 Marine Bird Bycatch in OPSAR (see Chapter 2.3).

In the HELCOM BLUES project it is envisaged to conduct a pilot assessment for waterbird bycatch in the Baltic Sea. However, the continuous lack of bird bycatch and fishing effort data will allow only to address some example case studies. The indicator provides three Assessment Methods to assess bycatch mortality:

Assessment Method 1 is intended to be used for all species and is based on Population Viability Analysis (PVA). Using a population model, it is examined whether measured (or estimated) bycatch mortality is threatening the viability of a population. In the 2021 JWGBIRD annual meeting, it was shown for the greater scaup that assessments using PVA are possible if bycatch data are available for the entire population, which in this case includes data for birds wintering outside the Baltic Sea in the Netherlands (Marchowski *et al*., 2020).

Assessment Method 2 is intended to be used for HELCOM red-listed species (HELCOM 2013). If data available do not allow to conduct a PVA, but the amount of bycatch is known, the bycatch mortality is assessed against the threshold of 1% of annual adult mortality. This approach does not need to include an entire population, but can be restricted to given assessment units, for which the number of birds present, and the amount of bycatch is known.

Assessment Method 3 is again only intended to be applied for HELCOM re-listed species. It simply looks existing bycatch, for which the proxy is used that there is spatio-temporal overlap in distributions of waterbirds and the exercise of fishing methods known to cause bycatch in these species. An already declining species cannot be in good status if it is additionally threatened by bycatch of any amount.

The way Assessment Method 1 can be applied was shown earlier by the example of the greater scaup (Marchowski *et al*., 2020), but the lack of fishing effort and bycatch data on population level in the assessment period (2016–2021) prevent its use for HOLAS 3. Assessment Method 2 is aspired to be applied to seaducks in the Polish section of the Baltic Sea, from where relevant data are available. Bycatch risk-mapping conducted under HELCOM BLUES shall provide information of spatio-temporal overlap in the occurrence of birds and fishery wherever information for an assessment unit is available.

4.4 Quality of waterbird habitats

Habitat for the species is an MSFD criterion not addressed in earlier HELCOM waterbird assessments. JWGBIRD has started to develop an indicator in which the quality of waterbird habitat is measured as the degree of disturbance from human activities taking place at sea. This development was also undertaken for the OSPAR Maritime Area and details are described in Chapter 2.4. Results from a pilot study in the German section of the Baltic Sea are published by Mercker *et al*. (2021b), Figure 4.1 shows an example result for the long-tailed duck.

The indicator concept was submitted for the use in HOLAS 3 as pilot assessment to HELCOM STATE and CONSERVATION 15–2021. There, no consensus was achieved, because one Contracting Party voted against the adoption as an indicator serving HOLAS 3. Therefore, only factual information regarding the disturbance of waterbirds from human activities will feed into the HOLAS 3 report, for example as a text box.

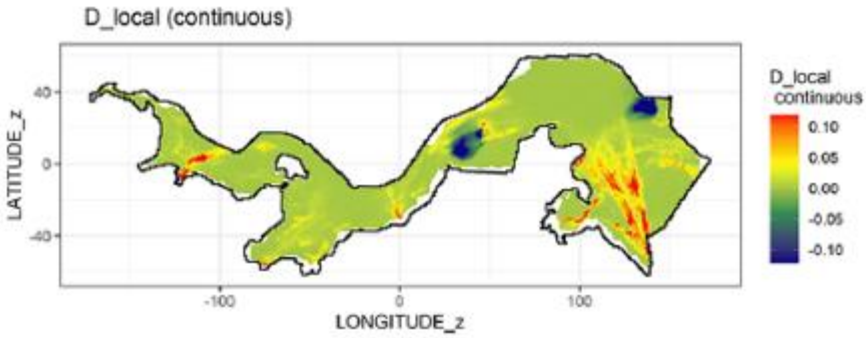

Figure 4.1. Distribution of D_{local} values expressing the degree of disturbance of long-tailed ducks from human activities across the Baltic Sea section of Germany. The higher the D_{local} value is, the stronger is the displacement compared to an undisturbed scenario. Negative values indicate attraction caused by human activities. Taken from Mercker *et al.* (2021b).

4.5 References

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Mercker, M., Markones, N., Borkenhagen, K., Schwemmer, H., Wahl, J. and Garthe S. 2021a. An integrated framework to estimate seabird population numbers and trends. Journal of Wildlife Management 85: 751–771.

Mercker, M., Dierschke, V., Camphuysen, K., Kreutle, A., Markones, N., Vanermen, N. and Garthe, S. 2021b. An indicator for assessing the status of marine-bird habitats affected by multiple human activities: A novel statistical approach. Ecological Indicators 130: 1–14.

O'Brien, S.H., Cook, A.S.C.P. and Robinson, R.A. 2017. Implicit assumptions underlying simple harvest models of marine bird populations can mislead environmental management decisions. Journal of Environmental Management 201: 163–171.

5 Develop methods for measuring and communicating confidence in OSPAR and HELCOM assessments

Marine bird assessments for OSPAR QSR 2023 and HELCOM HOLAS 3 are based on a huge amount of data and numerous indicator assessments on the level of species / populations, integrated to a much smaller number of species group assessments. Before starting the assessments, both conventions have defined how confidence shall be assessed and reported. This section briefly describes the approaches taken by OSPAR and HELCOM for their marine bird assessments.

5.1 Confidence statements for OSPAR QSR 2023

OSPAR laid down methods for confidence assessments in their QSR 2023 Guidance Document. For the marine bird assessments, confidence has to be assessed on two levels, the indicator assessments for species / populations and the integrated assessments for species groups. The ecosystem component marine birds is not assessed and therefore does not need to be treated in terms of confidence. In the two Common Indicators, which were widely used across species and regions (B1 Marine Bird Abundance, B3 Marine Bird Breeding Productivity) there is no confidence assessment for the status assessments of individual species, because the assessment values are running means of yearly index values for relative abundance and expected population growth rates. Rather, it was qualitatively assessed for the indicator as a whole in terms of data availability and consensus in methodology / maturity of methodology. Both criteria use three levels of confidence (high, moderate, low) and are summarized in Tables 5.1 and 5.2.

Table 5.1. Description of high, moderate and low data availability in OSPAR indicator assessments (taken from the QSR 2023 Guidance Document, OSPAR Agreement 2019-02).

Data availability (spatially and temporally)	Description
High	There are no significant data gaps identified, for example: • The assessment is undertaken using data with sufficient spatial coverage within the area being assessed. • The assessment is undertaken using sufficient temporal data collected over a period pertinent to the assessment.
Moderate	Some data gaps are evident, but this does not impact the overall outcome of the assessment, for example: • The assessment is undertaken using data with a mostly sufficient spatial coverage for the area assessed, but gaps are apparent in certain areas. • The assessment is undertaken using data with a mostly sufficient temporal coverage collected over a period pertinent to the assessment. Although some gaps are apparent.
Low	Significant data gaps have been identified (both spatially and temporally), for example: • The assessment is undertaken using limited data with poor spatial coverage within the area assessed. • The assessment is undertaken using limited data collected over a period that is limited (and therefore not pertinent to the assessment) or the assessment is largely informed by expert judgement.

Table 5.2. Description of high, moderate and low consensus in methodology / maturity of methodology in OSPAR indicator assessments (taken from the QSR 2023 Guidance Document, OSPAR Agreement 2019-02).

Consensus in methodology / maturity of methodology	Description
High	The assessment methodology requires only limited further development and updating for future assessments, for example: • The methodology used is widely accepted and is used in published international assessments. The methodology has been in use for a number of years. • There is a strong consensus within the scientific community regarding this methodology / approach to assessment.
Moderate	The assessment methodology could benefit from some further development for future assessments, for example: • The methodology presented is often used to assess this indicator and has been used previously in published assessments, but it is acknowledged that one or two aspects require further development. • There is consensus within the scientific community regarding this methodology, but there remain some questions around the methodology.
Low	The assessment methodology requires further development for future assessments, for example: • The methodology used has been developed specifically for this assessment and has not been used in a previously published assessment. • There is limited consensus within the scientific community regarding this methodology.

The integrated assessment is showing the status of species groups and feeding into the Thematic Assessment. As not only indicator assessments, but also other sources can join the integrated assessment (for example, species status assessments for ICG-POSH), a method independent of the confidence assessments for the indicators is recommended. The method for this is based upon the IPCC guidance on communicating the degree of uncertainty in key findings. This uses two criteria on the level of evidence and degree of agreement of the underlying assessments. These criteria are described in Tables 5.3 and 5.4.

Table 5.3. Description of robust, medium and limited evidence in OSPAR integrated assessments (taken from the QSR 2023 Guidance Document, OSPAR Agreement 2019-02).

Type, amount, quality and consistency of evidence	Description
Robust	There are multiple, consistent, independent lines of high quality evidence • there are multiple lines of evidence (indicator assessments, other assessments or third party assessments) with appropriate spatial and temporal scale providing suitable evidence
Medium	There is some high quality evidence but gaps remain • there are multiple lines of evidence (indicator assessments, other assessments or third party assessments), but the spatiotemporal coverage of those is limited OR • There are few lines of evidence (indicator assessments, other assessments or third party assessments), but they do have appropriate spatial and temporal scale providing suitable evidence
Limited	Evidence is limited • there are few lines of evidence (indicator assessments, other assessments or third party assessments), and the spatiotemporal coverage of those is limited

Table 5.4. Description of the degree of agreement in OSPAR integrated assessments (taken from the QSR 2023 Guidance Document, OSPAR Agreement 2019-02).

Degree of Agreement	Description
High	There is good consensus in the results of the assessments • the lines of evidence (indicator assessments, other assessments or third party assessments) all agree
Medium	The results of the assessments are mostly in consensus but with some deviation • the lines of evidence (indicator assessments, other assessments or third party assessments) mostly agree, although a minor proportion show some deviation
Low	The results of the different assessments do not agree • the lines of evidence (indicator assessments, other assessments or third party assessments) present differing results

In order to end up with a single indication of the confidence of an assessment result, the two criteria shown in Tables 5.3 and 5.4 are combined in a simple matrix, which makes it possible to specify the confidence in five levels (Figure 5.1).

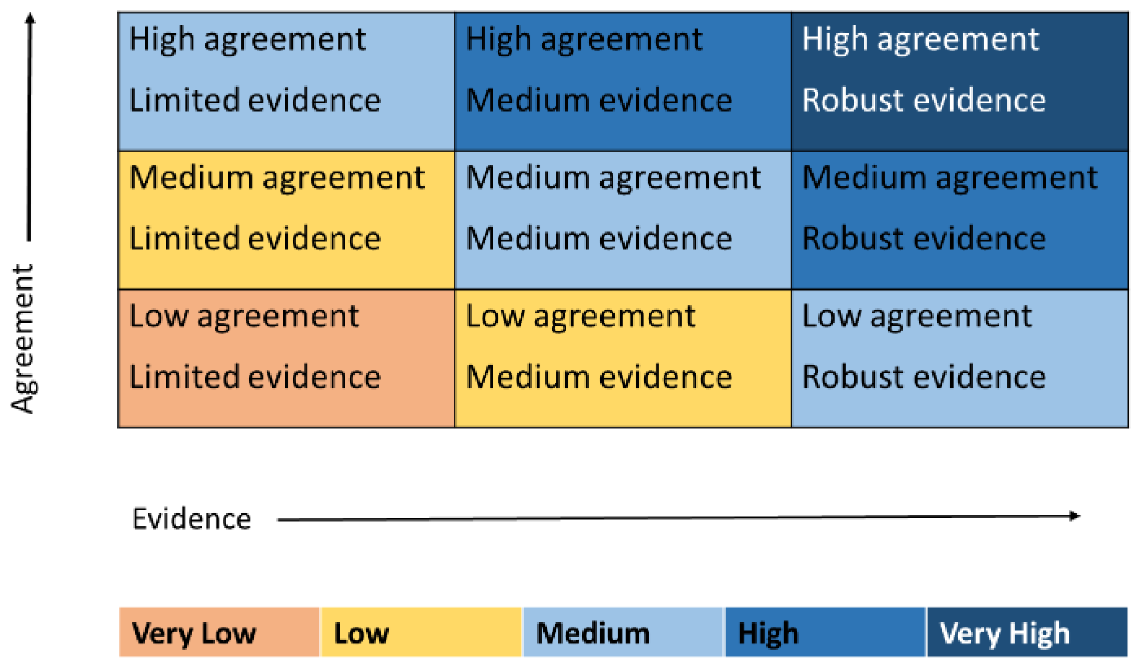

Figure 5.1. Matrix for the combination of evidence and agreement statements and their integration to five levels of confidence for assessments of marine bird species groups in OSPAR integrated assessments (taken from the QSR 2023 Guidance Document, OSPAR Agreement 2019-02).

5.2 Confidence statements for HELCOM HOLAS 3

For waterbird assessments in HELCOM HOLAS 3, the confidence of indicator results of individual species or populations is evaluated for four criteria: accuracy of estimate, temporal coverage, spatial representability and methodology. A score of high, intermediate or low is allocated to each species assessment in an indicator according to the descriptions in Tables 5.5 to 5.8. If indicators allow the calculation of standard error, this value is used for further integration (see below) rather than an estimate of accuracy.

Table 5.5. Description of high, intermediate and low accuracy estimates of HELCOM indicator results.

Score	Evaluation criteria
High	Does a compliance check to the threshold value show a clear signal whether GES has been achieved or not? i.e. GES has been / has not been achieved by at least 90% probability
Intermedi-ate	Does a compliance check to the threshold value show that values are generally clearly GES/sub-GES, though some outliers and variation in the data are present? i.e. GES has been / has not been achieved by 70 – 89% probability
Low	Does a compliance check to the threshold value not show clearly whether the data points are GES/sub-GES, and/or the overall evaluation is very close to the boundary? i.e. GES has been / has not been achieved by less than 70% probability

Table 5.6. Description of high, intermediate and low temporal coverage of HELCOM indicator results.

Score	Evaluation criteria
High	Does monitoring data cover the entire HOLAS II assessment period? i.e. if year-to-year variation occurs, are all years in the range 2016–2021 included? if year-to-year variation does not occur, are the requirements set for temporal frequency of monitoring met?
Intermediate	Does the monitoring data cover most of HOLAS II assessment period? i.e. if year-to-year variation occurs, are 3 or 4 years in the range 2016–2021 included?
Low	Does the monitoring data cover the HOLAS II assessment period inadequately? i.e. if year-to-year variation occurs, are only 1 or 2 years in the range 2016–2021 included? if year-to-year variation does not occur, are the requirements for temporal frequency of monitoring not met?

Table 5.7. Description of high, intermediate and low spatial representability of HELCOM indicator results.

Score	Evaluation criteria
High	Is the monitoring data are considered to cover the full spatial variation of the indicator parameter in the assessment area? i.e. does the data represent reliably at least 90% of the relevant habitat type(s) in the assessment area? if a clear spatial gradient or patchiness is shown in the parameter value, is the monitoring set to cover at least 90% of this variation?
Intermedi-ate	Is the monitoring data considered to cover most of the spatial variation of the indicator parameter in the assessment area? i.e. does the data represent reliably at least 70–89% of the relevant habitat type(s) in the assessment area? if a clear spatial gradient or patchiness is shown in the parameter value, is the monitoring set to cover 70–89% of this variation?
Low	

Table 5.8. Description of high, intermediate and low methodological confidence of HELCOM indicator results.

Score	Evaluation criteria
High	For indicator parameters that have HELCOM guidelines for monitoring: has the monitoring been conducted according to these? and Is the data quality assured according to HELCOM or other internationally accepted guidelines?
Intermediate	For indicator parameters that have HELCOM guidelines for monitoring: has the monitoring been conducted only partly according to these? and / or Is the data from mixed sources, partly quality assured according to HELCOM or other international standards? and / or Is the data quality assured, but according to local standards?
Low	For indicator parameters that have HELCOM guidelines for monitoring: has the monitoring data not been collected according to these? or Is the monitoring data not quality assured?

For the integration of species group status and to higher levels of the assessment of the status of the Baltic Sea the BEAT tool is used (HELCOM 2018). To allow the integration, the confidence estimates originally provided in categorical form (as low, intermediate and high) are translated into numerical values (0, 0.5 and 1), where higher values mean higher confidence. The four confidence criteria are then averaged for each indicator input result (species or population) to a single confidence score. This confidence score is then used in the BEAT integration: species -> species group -> overall bird result, in each assessment unit. The final confidence score is presented in categorical form, where confidence scores below 0.5 are classified as low, from 0.5 up to and including 0.75 as intermediate and above 0.75 as high.

5.3 References

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6 Support ICES advisory services

6.1 Introduction

In 2021, ICES requested JWGBIRD to provide input on matters related to interactions between marine birds and anthropogenic activities at sea, particularly on incidental captures (bycatch) in fishing gears. In particular, a request was made to support the ICES roadmap for bycatch advice (https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2020/2020/Roadmap_ICES_Bycatch_Advice.pdf), by providing additional sources of bycatch data not yet referenced in WGBYC reports. Moreover, ICES called for an assessment of the effects of anthropogenic activities on marine birds other than bycatch. This request was discussed briefly, but in the absence of a specific format or area to focus on (e.g. impact of wind turbine implementation, population effect of oiling, etc.), the group decided to postpone the work on this task to a later date. Additionally, ICES demanded assistance to evaluate a request from NEAFC (Northeast Atlantic Fisheries Commission) to compile and aggregate available data on bird bycatch in the NEAFC regulatory area, including the spatio-temporal distributions of the bird species vulnerable to bycatch and the associated fisheries susceptible to capture these birds. Specifically, JWGBIRD was requested to review the section for the WGBYC 2021 report that addressed that particular special request from NEAFC.

6.2 Inventory of bird bycatch data in support of the ICES roadmap for bycatch advice

6.2.1 Background

WGBYC routinely collects and assembles data on bycatch of PETS (Protected, Endangered, and Threatened Species), including seabirds, and on fishing effort, obtained from national monitoring under (EC) Regulation 812/2004 (now replaced with Regulation (EU) 2019/1241) and from additional regular data calls. These data calls cover a wide geographical area comprising a large fraction of the fisheries operating in the northern Atlantic (FAO Major Fishing Areas 21 and 27), and the Mediterranean and Black Seas (FAO Major Fishing Area 37). EU Member States are legally bound to answer these data calls, and non-EU ICES member states with fisheries operating in the geographical areas mentioned above are required to provide data to assist fisheries management and bycatch assessments under OSPAR, HELCOM, and UNCLOS (WGBYC-2021: Data call 2021 related to bycatch of protected species for ICES advisory). Moreover, with the Commission Implementing Decision (EU) 2016/125 (EU MAP), a regional database and estimating system (RDBES) is being implemented and this will enhance the consistency and the quality of the data reported to WGBYC. In the latest report to date, WGBYC acknowledges a paucity in the data at their disposal that prevents a complete evaluation of the overall impact of fisheries on PETS (ICES, 2020b).

In order to support the ICES roadmap for bycatch advice, ICES requested JWGBIRD to assemble bird bycatch data and information from additional sources other than the data call contributing to the work of WGBYC, including stranding data, entanglement, interviews, research projects, and national or local monitoring programmes. The working group JWGBIRD understood this request as listing additional sources of information on bird bycatch not mentioned in WGBYC reports, including information on absence of bycatch where available (Table 6.1). Entanglement in man-made objects (e.g. fishing nets, fishing line, rubber balloons, plastic bags and sheeting, or metal cans) was not considered in this section, as it is covered in detail in section 1 of this report. The sources of information used in the present report section were primarily a recent OSPAR report supporting the OSPAR indicator B5 Marine Bird Bycatch, commissioned by JNCC (Oliveira, *in prep.*), which supplemented the WGBYC database with bycatch surveys from 41 additional sources in the OSPAR region, with data stemming from OSPAR-contracting as well as non-members countries. In the Baltic area, HELCOM ACTION (2021) provided an extra source of data on bycatch, and other reports were also used as additional sources.

6.2.2 Additional sources of bycatch data

The number of incidental captures of seabirds in fishing gears can vary greatly in space and in time, and seabird bycatch is both a fishery- and a species-dependant phenomenon. The bycatch and fishing effort data made available to ICES WGBYC are supposed to procure a scientific basis for assessing the levels of bycatch in Northern-Atlantic fisheries, but these data are largely incomplete for some species (or populations) of seabirds, and for some fisheries. Often, the data reported to WGBYC may not be statistically representative, i.e. the temporal stratification and the spatial sampling units used in bycatch and fishing effort monitoring programmes do not adequately reflect the distribution and intensity of the fleets fishing effort, and of the subsequent bycatch rates (Oliveira, *in prep.*). As such, data on bycatch and effort should be given at the finer spatio-temporal scale possible, including as detailed information as possible on fishing gears and on captured animals (including notably species, and, when possible, sex and information on the sexual maturity of the taken as bycatch individuals). Besides the spaciotemporal distribution of birds and fisheries, many parameters are susceptible to influence bycatch rates, including e.g. population demographics, prey availability, or environmental variables (water temperature, occurrence of storms, etc.). Despite the importance of these factors to explain and eventually predict bycatch occurrences, these data are only seldomly recorded in fisheries operating in the OSPAR, HELCOM, and ICES areas.

Given on the one hand the low bycatch monitoring effort in some fisheries in the OSPAR/HELCOM/ICES regions, particularly in small-scale fisheries, and on the other hand the lack of accuracy in the bycatch recordings (e.g. no reporting of zero-bycatch in many datasets, fishing effort reported at a coarse scale, or simply absence of bycatch/effort data), seabird bycatch numbers are difficult to estimate with precision from the WGBYC database alone (ICES, 2019, 2021). These data can be complemented with additional sources to reduce the uncertainty around the bycatch estimates when it is possible to evaluate, or to identify areas where seabird bycatch is presumably problematic in data-limited fisheries. To that end, stranding data can help cast a light on fisheries or areas where incidental captures are higher than what is reported in official records (e.g. Hamel *et al.*, 2009). Drift models can help identify the provenance and possible cause of death of stranded individuals, by comparing the plausible origin of the carcass to the distribution of fisheries, as conducted for marine mammals in the Bay of Biscay (Peltier and Ridoux, 2015; ICES, 2020a; Peltier *et al.*, 2020), or recently for seabirds in Norway (Christensen-Dalsgaard *et al.*, 2022). Collection of beached birds is done routinely in all ICES Member Countries either by established research bodies, by citizen-based initiatives, or both, so such modelling approaches could be initiated in future to learn more on the provenance of dead seabirds across European waters. Nevertheless, until now, previously published research using bird stranding data focused mostly on evaluating the impact of oiling on populations (Camphysen and Heubeck, 2001), and bycatch in fishing gears seems to have received less interest in comparison (but see Žydelis *et al.*, 2006). Although data from beached bird surveys may be partial and insufficient to assess the magnitude of bycatch occurrence, they can bring valuable information on the areas of higher bycatch risks and the species impacted (Žydelis *et al.*, 2009). In the absence of direct evidence of bycatch, or to complement patchy datasets, interviews with fishers who may capture birds in their gears are useful to appraise the scale of the problem locally. In the Baltic Sea, there is evidence that bycatch in small-scale gillnet fisheries is putting some seabird populations under pressure (Žydelis *et al.*, 2009; Glemarec *et al.*, 2020; Marchowski *et al.*, 2020; HELCOM ACTION, 2021; Larsen *et al.*, 2021; Morkūnas *et al.*, 2022). Yet, important gaps in vessel monitoring exist that limit understanding the spatio-temporal distribution of the fisheries susceptible to high levels of seabird bycatch. For instance, the German gillnet fleet, which operates principally in the western part of the Baltic Sea, is composed mostly of vessels below 8 metres (Meyer and Krumme, 2021), which are not legally required to fill in logbooks to report their fishing activity, but only monthly declarations. Bellebaum (2013) estimated the average minimal total bird bycatch in the German Baltic fleet above 17,500 animals annually during the period 2006–2009 using a mixture of interviews and field studies. Recently, Barz *et al.* (2020) documented how bycatch mitigation is perceived by German coastal fishers, and how this may influence future fisheries management decisions and bycatch research. In a heterogeneous fishing fleet as is the German Baltic fleet, and in the absence of precise recordings of effort, fishing effort intensity can be reconstructed by analysing sequences of landings (Meyer and Krumme, 2021). Until all small-scale fishers will record and report bird bycatch accurately, studies combining interviews and local monitoring are likely the way forward to map seabird bycatch high-risk areas in the Baltic region (Psuty and Calkiewicz, 2021). Nevertheless, the EU seems aware of the recurring issues regarding fisheries-dependant data paucity in the smallest segments of the fleet and is working on amending the current control regulations (EU/EC, 2018). This proposal would require all vessels regardless of size to register and report detailed information on fishing effort, notably by implementing mandatory usage of a tracking system for all vessels, alongside with compulsory logbook displaying detailed information on fishing gear characteristics for each fishing trip. If voted by the European Parliament, the proposed amendments will considerably improve our knowledge of the fishing effort distribution in the EU and eventually allow to calculate or refine bycatch mortality estimates at the scale of the Union.

Table 6.1 Bird bycatch data and qualitative information from additional sources than by WGBYC (incl. strandings, entanglement, interviews, research projects, national and local monitoring). Modified from Oliveira (2021).

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
A contribution to reducing bycatch in a high priority area for seabird conservation in Portugal	SPEA	Paper	Portugal	2015–2018
An assessment of seabird – fishery interactions in the Atlantic Ocean	ICCAT	Paper	I, III, IV, V	2003–2006
Annual Report for data collection in the fisheries and aquaculture sectors	National Marine Fisheries Research Institute	Technical report	Poland	2017
Assessing incidental bycatch of seabirds in Norwegian coastal commercial fisheries: Empirical and methodological lessons	Norwegian Institute for Nature Research	Paper	Norway	2009
Attendance of scavenging seabirds at trawler discards off Galicia, Spain	Instituto Español de Oceanografía	Paper	IV	1998–1999
Best practices to mitigate seabird bycatch in longline, trawl and gillnet fisheries — efficiency and practical applicability	Fish Capture Division, Institute of Marine Research	Paper	Norway	
Bird Bycatch in the Icelandic Gillnet Lumpfish Fishery	BioPol	Technical report	Iceland	2015
Bycatch in gillnet fisheries – An overlooked threat to waterbird population	DHI Water-Environment-Health	Paper	II	<2009
Bycatch of Cory's shearwater in the commercial longline fisheries based in the Mediterranean coast and operating in East Atlantic waters: First approach to incidental catches of seabird in the area	Instituto Español de Oceanografía	Paper	Spain, Azores	2004–2011

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
Bycatch of high sea longline fisheries and measures taken by Taiwan: Actions and challenges	Fisheries Agency and the Overseas Fisheries Development Council of the ROC	Paper	V	2002–2008
Bycatch Of Seabirds and Marine Mammals In Lumpsucker Gillnets 2014–2017	Marine and Freshwater Research Institute	Technical report	Iceland	2014–2017
Bycatch of the European purse-seine tuna fishery in the Atlantic Ocean for the 2003–2007 period	IRD/IEO/AZTI scientists.	Paper	IV	2003–2007
Common methodology for assessing the impact of fisheries on marine Natura 2000	N2K group	Technical report		
Contribution to the preparation of a Plan of Action for Seabirds	MRAG Ltd	Technical report	III (Gran Sol and Netherlands)	2010
Determination of the level of bird mortality in the static net fishery in 2002–2003, execution of experiments with alternative fishing techniques and evaluation of measures for the 2003–2004 season (Bepaling van de omvang van devogelsterfte in de staande nettenvisserij in 2002–2003, uitvoering vanexperimenten met alternatieve visserijtechnieken en evaluatie vanmaatregelen voor het seizoen 2003–2004)	Ministerie van LNV	Technical report	Netherlands	2002–2003
Distribution of seabird bycatch using data collected by Japanese observers in 1997–2009 in the ICCAT area	National Research Institute of Far Seas Fisheries, Orido ICCAT	Paper	I, V	1997–2009
Estimation of discards in Norwegian coastal gillnet fisheries	Norwegian Institute for Nature Research	Technical report	Norway	2012–2018

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
Gillnet bycatch of seabirds in Southwest Greenland, 2003 - 2008	Greenland Institute of Natural Resources	Technical report	Greenland	2003–2008
Global seabird bycatch in longline fisheries	RSPB, SEO/BirdLife	Paper	III, V	2006–2007
Incidental bycatch of northern fulmars in the small-vessel demersal longline fishery for Greenland halibut in coastal Norway 2012–2014	Norwegian Institute for Nature Research (NINA)	Paper	Norway	2012–2014
Interactions of Marine Protected Species with Artisanal Fisheries in the Parque Natural do Sudoeste Alentejano e Costa Vicentina (Pnsacv) and Adjacent Classified Areas (SPAs AND SACs)	CCMAR-UAlg, FCUL	Thesis	Portugal	2018
Longline fisheries in the NE Atlantic, a threat for seabirds?	Instituto Español de Oceanografia	Conference paper	Spain	
Bycatch of seals, harbour porpoises and birds in Swedish commercial fisheries. Fiskeriverket informerar 2004/8, Öregrund, Göteborg, Sweden	Fiskeriverkets kustlaboratorium	Technical report	Sweden	2002
Observations on interaction between seabirds and the Spanish surface longline fishery targeting swordfish in the Atlantic Ocean during the period 1993–2017	Instituto Español de Oceanografía	Paper	Spain, Portugal, Azores	1993–2017
Portugal Annual Report for data collection in the fisheries and aquaculture sectors - 2019	DGRM	Technical report	Portugal (including Azores)	2019
Programa De Observação Para as Pescas Dos Açores - POPA - Relatório de actividades 2019	IMAR – Instituto do Mar Departamento de Oceanografia e Pescas da Universidade dos Açores	Technical report	Portugal - Azores	2019

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
Reducing Seabird Bycatch in Longline Fisheries by Means of Bird-Scaring Lines and Underwater Setting	Institute of Marine Research Bergen, Norway	Paper	Norway	1998
Report of the 2018 ICCAT Subcommittee on Ecosystems Meeting	ICCAT, IPMA	Technical report	I, III, IV, V	
Report of the Workshop to Review and Advise on Seabird Bycatch (WKBYCS)	International Council for the Exploration of the Sea	Technical report		2000–2011
Review and evaluation of three mitigation measures - bird-scaring line, underwater setting and line shooter - to reduce seabird bycatch in the North Atlantic longline fishery	Norwegian Institute for Nature Research	Paper	Norway	1992, 1996, 1998, 1999
Seabird bycatch in fishing gear in Iceland	Icelandic Institute of Natural History	Paper	Iceland	< 2001
Bycatch Of Seabirds and Marine Mammals In Lumpsucker Gillnets 2014–2017	Marine and Freshwater Research Institute	Technical report	Iceland	2014 - 2017
Seabird bycatch in Portuguese mainland coastal fisheries: An assessment through on-board observations and fishermen interviews	SPEA	Paper	Portugal	2010 - 2012
Seabird mortality from longline fishing in the Mediterranean Sea and Macaronesian waters: a review and a way forward		Paper	V	<1999
SPAIN Annual Report for data collection in the fisheries and aquaculture sectors - 2017	Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente Secretaría General de Pesca and IEO	Technical report	Spanish fisheries (North Sea (ICES IIIa, IV, and VIId areas) and Eastern Arctic (ICES areas I, II)	2017

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
The impact of longline fishing on seabirds in the Northeast Atlantic: recommendations for reducing mortality	RSPB, NOF, JNCC, BL	Technical report	Norway (ICES area I)	1997 - 1998
The incidental catch of seabirds in gillnet fisheries: A global review	DHI, Agern Allé 5, DK-2970 Hørsholm, Denmark	Paper	World with a regional focus (incl. Baltic, Norwegian, and North Seas, Atlantic Iberia, Iceland, and Faroe Islands)	1990–2002, 2009 - 2010
The status and trends of seabirds breeding in Norway and Svalbard	Norwegian Institute for Nature Research	Technical report	Norway and Svalbard	
Trials using different hook and bait types in the configuration of the surface longline gear used by the Spanish swordfish (Xiphias gladius) fishery in the Atlantic Ocean	Instituto Español de Oceanografía	Paper	Five zones of the North and South Atlantic Ocean	2005 - 2006
United Kingdom Annual Report for data collection in the fisheries and aquaculture sectors 2017–2019 Version 1– 2017	Marine Management Organization, England Agri-Food and Biosciences Institute, Northern Ireland Marine Scotland, Marine Laboratory Scotland Centre for Environment, Fisheries and Aquaculture Science, England Environment Agency Natural Resources Wales Welsh Government	Technical report	UK fisheries (North Sea, Celtic Sea, and Artic waters)	2017
What's the catch with lumpsuckers? A North Atlantic study of seabird bycatch in lumpsucker gillnet fisheries	Norwegian Institute for Nature Research	Paper	Norway Iceland Denmark Sweden Greenland	Norway - 2012, 2013, and 2015 Iceland – 2014 - 2017 DK – 2010 - 2018 Greenland - 2013–2016
ZEPAMAR	SEO/BirdLife	Project	Spain (Galicia)	2004, 2005, 2016–2018
Bycatch of marine mammals and seabirds: Occurrence and mitigation	National Institute of Aquatic Resources, Technical University of Denmark	Technical report	Denmark	2010 - 2018

Name	Organization	Type of publication	Spatial coverage	Temporal coverage
Assessing seabird bycatch in gillnet fisheries using electronic monitoring	National Institute of Aquatic Resources, Technical University of Denmark	Paper	Denmark (Øresund)	2014–2018
Bycatch in Baltic Sea commercial fisheries: High-risk areas and evaluation of measures to reduce bycatch	HELCOM	Technical report	Baltic Sea	2018
Miljøskånsomhed og økologisk bæredygtighed i dansk fiskeri	National Institute of Aquatic Resources, Technical University of Denmark	Technical report	ICES areas IV and III	2001 - 2004 and 2010 - 2019
Mortality of waterfowl on the Polish Baltic seashore in the 1998/1999 season	Uniwersytet Gdanski	Paper	Poland	1998 - 1999
Auswertung landesweiter Datenquellen (International Beached Birds Survey, Pathologie des LALLF M-V, Ringwiederfunde)	Naturschutz und Geologie Mecklenburg-Vorpommern	Technical report	German Baltic	1992 - 2006
Beached bird surveys in Lithuania reflect oil pollution and bird mortality in fishing nets	Institute of Ecology of Vilnius University	Paper	Lithuania	1992 - 2003
Seabird bycatch in a Baltic coastal gillnet fishery is orders of magnitude larger than official reports	Lithuanian Ornithological Society	Paper	Lithuania	2015 - 2020
Seabird beachcast events associated with bycatch in the Norwegian purse-seine fishery	Norwegian Institute for Nature Research (NINA)	Paper	Norway	2015 - 2019
Balearic shearwater and northern gannet bycatch risk assessment in Portuguese Continental Waters	Portuguese Wildlife Society	Paper	Portugal	2010 - 2015

6.3 Additional tasks

6.3.1 Bird bycatch in the Northeast Atlantic Fisheries Commission (NEAFC) areas

In 2021, ICES received a special request for advice from the NEAFC (Northeast Atlantic Fisheries Commission) "to compile and aggregate available data on bird bycatch in the NEAFC regulatory area, including the spatio-temporal distributions of the bird species vulnerable to bycatch and the associated fisheries susceptible to capture these birds". Specifically, JWGBIRD was requested to review the section for the WGBYC 2021 report (ICES, 2021) that addressed that particular special request from NEAFC.

NEAFC lacks detailed data on effort and species-specific bycatch rates, so JWGBIRD recommends working on:

1. Encouraging the implementation of monitoring methods to produce unbiased data useful for further statistical analyses (notably, EM and/or trained observers)
2. Developing risk maps from fishing effort and bird distributions maps. None of them being fully available in the NEAFC areas at the time of writing.
    a) ICES has access to the VMS data from the vessels in the NEAFC areas, so these data could be used to estimate fishing effort. Associated with bird distributions maps, ICES may be able to produce risk maps that would inform fisheries managers and point to the areas/métiers that future dedicated monitoring should focus on. However, bird abundance surveys, which could be used for risk-mapping are only available for parts of the NEAFC area (especially, OSPAR Regions II and IV), so it would be most promising to complement these with existing tracking data (e.g. http://seapop.no/en/seatrack/, where a number of species vulnerable to bycatch are shown in seasonal distribution patterns).
    b) Such work would require additional funding and dedicated workshops to be lifted by JWGBIRD.

6.3.2 Assessment of the effects of anthropogenic activities on marine birds other than incidental bycatch/fisheries

Except for the effects of litter on marine birds, no specific format or region was addressed by JWGBIRD in the 2021 meeting. However, most human activities and their effects on marine birds were discussed on several occasions at meetings and reviewed in the annual reports of JWGBIRD and its predecessors since 2002, including oiling, litter, shipping, renewable energies, and climate change. Therefore, references to the effects of anthropogenic activities other than incidental bycatch/fisheries on marine birds are already readily available from previous reports, although these may need to be updated to reflect the progress from more recent research.

6.3.3 Determine and further advance methods to assess the resilience of protected bird species to bycatch

Still in a very early stage. It appears that as long as DGMARE has not explicitly formulated objectives and guidance, the group will not be able to advance on this task.

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7 European Seabirds at Sea (ESAS): Revitalization project

JWGBIRD meeting 2021, November 10th

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The European Seabirds at Sea (ESAS) database finds its origin in the 'Seabirds at Sea' project that was initiated in 1979, following the discovery of major oil potential in the North Sea and the associated need to gain yet inexistent knowledge of the occurrence and distribution of seabirds in their offshore habitat. The main accomplishments in the years that followed were a standardization of the data collection method, the execution of large-scale ship-based surveys across northwest European waters and a first European-wide data assembly in 1991, i.e. the actual formation of the ESAS database.

After decades of joint activities and data sharing between ESAS members, however, no more updates of the ESAS database v5 occurred after 2011. Also, very few aerial surveys appeared to be included, due to incompatibility of such survey data with the ESAS database format. All this, together with a renewed need of knowledge of the spatio-temporal offshore distribution of seabirds (considering the many spatial claims for wind farming), resulted in the ESAS revitalization project, as part of the Dutch WOZEP research program. The project was split up into 4 work packages:

- WP1 - Inventory of Seabirds at Sea (SAS) monitoring programs and assessing the possibilities for their inclusion in the ESAS database
- WP2 - Accomplishing a data sharing agreement among ESAS members
- WP3 - The migration of the ESAS database to ICES Data Centre
- WP4 - Update ESAS v5 with Dutch, German and Belgian data

Within work package 1 we gained input from 30 organizations on 44 SAS monitoring programs. Of those, 21 are not even partially integrated in ESAS v5. And while there appeared to be a broad willingness to share the data, legal objectives were mostly brought forward as the main bottleneck to do so. During an international workshop, it was concluded that joint international efforts will be essential to facilitate a continuous transfer of data and to maintain a vital ESAS database. It was therefore recommended to install a network of delegates, with one or two representatives per country, and to coordinate this network by a central ESAS steering committee.

In a next step, the ICES data policy (https://www.ices.dk/data/guidelines-and-policy/Pages/ICES-data-policy.aspx) was adopted as the ESAS data sharing agreement. Importantly, ESAS members will have the choice to keep their data restricted or public, and public data will fall under the Creative Commons license CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/). Restricted data will, however, be used to supply publicly available aggregated data products, i.e. mean densities per species, year, month and 10x10 km UTM grid cell.

As part of the migration of the database (work package 3), we have accomplished a fully revised data model that complies with ICES Data Centre standards and meets the demands of a future-proof ESAS database. The last agreed version can be consulted at https://ices-tools-dev.github.io/esas/. The actual migration of the database is now foreseen in autumn 2022.

In the 4th and last work package we updated the ESAS database with Dutch, German and Belgian SAS data. The resulting ESAS database v6.1 now includes seabird counts collected during 1.556.078 km of ship-based and aerial surveying across Northeast Atlantic waters. In total, 18 European institutes and organizations have contributed.

After finalizing the revitalization project, continued efforts will be needed. Next and important steps are the strengthening of the ESAS network, the inclusion of many more data (e.g. from the Mediterranean and the Baltic) and the construction of a website supplying interactive database exploration, detailed descriptions of methodological standards and tools for database transformation and validation. Ultimately, we hope that a vital ESAS database in turn will help to initiate joint surveys and analyses among old and new ESAS database contributors, and thus enhance the research and monitoring of seabirds in and around the North Sea.

Annex 1: List of participants

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Annex 2: OSPAR-HELCOM-ICES Joint Working Group on Marine Birds (JWGBIRD) work programme 2021–2023

JWGBIRD work themes

This work programme provides a thematic overview of the work carried out by JWGBIRD. Tasks under each theme are listed in Annex 2 – Task List and will be updated on an annual basis.

The aim of describing a three-year work programme is to facilitate the sign-off process that follows different annual schedules for OSPAR, HELCOM, and ICES. The aim is also to allow long-term planning and delivery of significant products that may require several components to be developed during consecutive years.

Database and data products

This work theme encourages JWGBIRD to move towards a more transparent way of working with data and assessments (i.e. TAF, transparent assessment framework) and allows JWGBIRD to produce seamless cross-regional data products.

Work under this theme includes:

c) Definition of appropriate, and whenever possible, compatible formats for data submissions and storage,
d) resolving data issues associated with the database and/or specific datasets,
e) providing checks for re-submissions to the databases,
f) developing data products for assessments, advice and public use
g) specifying technical aspects of how to make data stream processes operational, e.g. to automate delivery of indicator assessments through scripts.

JWGBIRD will provide input to the ICES Data Centre that hosts the biodiversity portal containing the *OSPAR seabird database*. The database contains data on breeding numbers and productivity of seabird and waterbird species collected at breeding sites across the OSPAR Area. It also contains data on numbers of wintering and passage waterbirds (incl. waders) from coasts and estuaries, which are counted mostly from land and in some cases, from the air. These data will be used to construct regional indicators, baselines and thresholds to assesses OSPAR's common indicators on B1 – marine bird abundance and B3 – Marine bird productivity. The OSPAR seabird database could be expanded to cover the Baltic Sea and become a cross-regional database. JWGBIRD will explore the possibility of including data on numbers of breeding and wintering waterbirds and seabirds in the Baltic. HELCOM Biodiversity Database hosts data for all species relevant to the Baltic Sea region and, where possible, automated harvesting between the two databases should be explored.

JWGBIRD will oversee the *European Seabirds at Sea (ESAS) database*, which is the only current cross-regional data product considered by the group. The database is in the process of being migrated to ICES at the beginning of the JWGBIRD work programme. ICES Data Centre together with JWGBIRD experts are preparing to take over the hosting, maintenance and development from the previous hosts. The ESAS database work will be further steered by the dedicated ESAS subgroup of JWGBIRD. The ESAS database covers the entire ICES area and includes 'at-sea' data. The data can be used for ICES advisory products and for OSPAR and HELCOM assessments.

To support the work on migrating birds under the auspice of JWGBIRD there is a need to establish functioning dataflows and agreed data hosting for *data specific for migration*, such as telemetry and tracking data, migration count data etc. For this purpose, existing options should be identified and their suitability for the needs of the group explored.

Monitoring

Work under this theme includes:

h) Providing a forum for discussion of monitoring programmes, focusing on the development of joint or coordinated monitoring e.g. at-sea protocols, and contributing to ICES advisory products regarding monitoring practices and programmes as appropriate.

i) Providing updates to OSPAR CEMP guidelines and appendices[4], HELCOM monitoring programmes and guidelines when required.

j) Providing expert opinion on the development and implementation of new monitoring strategies and guidelines for birds, e.g. in relation to threatened and declining species, bycatch, wintering birds, migration routes and distribution.

Assessments

Work under this theme includes:

k) Ensuring information flow with regular communication to all three convention secretariats on policy development relevant to JWGBIRD and/or general bird related issues.

l) Providing updates of indicators for the OSPAR Quality Status Report 2023 (QSR 2023) and for the HELCOM HOLAS III

m) Developing further, existing Common and Candidate Indicators and/or develop new indicators, where a need has been identified by one or more of the Conventions, including requirements concerning the criteria addressed in MSFD assessments to be conducted by Member States of the European Union.

n) Developing integration methods and other aspects of indicator assessment, which require further development to be in line with MSFD assessment requirements under the revised Commission Decision (2017/848).

o) Delivering a Thematic Assessment of marine birds for the OSPAR QSR 2023, which includes an integrated assessment of status of species and species groups, an assessment of pressure impacts and on the effectiveness of current measures.

p) Conducting other assessments, including for example assessments of threatened and declining species, biogeographic analysis and ecosystem overviews.

q) Contributing bird-related information to assessments carried out by other relevant groups, e.g. on issues such as incidental bycatch or foodwebs.

Ad hoc expert consultation

Responding, as needed, to queries from the parent organizations and their respective subsidiary bodies relating to bird issues by providing expert opinions.

Provision of expert input to ICES advisory process

Provide expert input to advice requests in ICES including the ecosystem and fisheries overviews. Such input would be peer reviewed and quality assured before ICES advice is published.

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[4] Co-ordinated Environmental Monitoring Programme (CEMP) – the CEMP guidelines and appendices are published for each OSPAR Common Indicator. They provide instructions on how to collect data to construct the indicators and on how to assess state or trends in the indicator.

Ways of working

JWGBIRD annual meetings

To date much of the work of JWGBIRD has been concentrated around the annual meetings. These usually take place in either October or November and should, when possible, be timed to ensure delivery of products into the respective parent organization's processes. Annual meetings can be held online if required by public health issues.

Where project resources are available, specific actions carried out by JWGBIRD can be resourced through projects, for example co-financed projects. This might have implications for the timing of completing actions in specific years or months. Whenever a project resourced activity is planned, JWGBIRD will communicate details on the planning to OSPAR, HELCOM and ICES well in advance of the activity to allow dissemination of the information to all possibly concerned parties.

An additional meeting is planned in Spring 2022 as part of the NEA-PANACEA project (details below). This extra meeting, called 'JWGBIRD-PLUS' will be extended to seabird experts from the Mediterranean and Black Sea, in order to promote dialogue and cooperation across the four European regions.

Subgroup working

Subgroups may be defined in order to work more thematically, especially where it is foreseen that completing the task would require substantive work which might stretch across several meeting cycles.

Task descriptions should be developed for each subgroup individually.

At present, work related to European Seabirds at Sea (ESAS) database is carried out by the ESAS subgroup of the JWGBIRD. In addition, the need to establish a designated subgroup focusing on bird migration has been identified and supported.

Intersessional work

JWGBIRD may be asked for expert opinion and/or intersessional work at short notice. These requests may not always be directly related to the environmental programmes of the conventions but may be relevant to other international processes and policies. When such actions are requested of JWG BIRD the group will keep OSPAR, HELCOM and ICES respectively informed of ongoing actions. Expert opinion may be required at more frequent intervals than annual, and the annual meeting cycle and reporting format of the group may not necessarily be the most appropriate forum in which to deal with such requests (e.g. due to mismatched deadlines). Correspondence and intersessional work between relevant group members should be used to provide a timely delivery of required outputs. Contracting Parties of the various conventions will need to be made aware of the resources (i.e. time of experts) that will be required for all aspects of the Group's work.

Delivery of results

The JWGBIRD annual report includes products under each work theme that are specific to the annual list of tasks required of the group. Products developed and delivered intersessionally shall be appended to the report. The report is co-authored by the three organizations.

The group, or a co-chair as a representative of the group, can deliver communications or short expert opinions when required at short notice and independent of the annual timing of the JWGBIRD meeting. If possible, such responses should be summarized in the annual report.

The group should also aim, where possible and appropriate, to submit some products for publication in scientific journals or to be presented at conferences.

At the end of the three-year period covered by this work programme, the group shall present an overview of the products delivered. The overview should detail the products delivered under each of the themes outlined above. The overview will feed into an ICES, peer review and advice process as relevant.

Group membership

Membership of JWGBIRD is obtained by experts seeking nomination from their national delegations to either ICES, OSPAR or HELCOM. It is important that all members of JWGBIRD have a firm connection to their national delegations.

The JWGBIRD co-chairs can also invite non-members to attend the annual meeting or to take part in intersessional work. Invited experts should demonstrate skills that are relevant to the delivery of a specific request. A list of members and their affiliations is available on the JWGBIRD web pages (link) and is updated annually.

The group is open to connect with other relevant bird groups and networks, for example groups working in the Arctic region and/or non-governmental organizations.

This group is led by three co-chairs representing each of the conventions. There is currently no limit on the length of tenure of each co-chair[5]. This arrangement should be reviewed by members on an annual basis. The arrangements of the relevant sponsoring convention for each chair should be followed if a chair is to be replaced.

Convention specificities

OSPAR

JWGBIRD reports to OSPAR's Biological Diversity Committee (OSPAR BDC) via the Intersessional Correspondence Group on Coordination of Biodiversity Assessment and Monitoring (ICG-COBAM). There is also a need for JWGBIRD to collaborate with national leads to deliver actions on OSPAR's Threatened and Declining bird species via ICG-POSH (Protected Species and Habitats) which is also under OSPAR BDC.

Key OSPAR work areas for JWGBIRD during 2021–2023 will centre on delivery of the Quality Status Report 2023. This includes the updated assessment of common indicators, pilot assessments of candidate indicators and an integrated Thematic Assessment of marine birds (see Table 1 and Annex 2 – Task List).

Table 1. Indicators assessments to be delivered by JWGBIRD for the OSPAR QSR 2023.

Indicator name	Type	Lead	Region I	Region II	Region III	Region IV	Region V
B1 - Marine bird abundance	Common	Ian Mitchell (UK), Volker Dierschke (DE)	*update* *(R1 data in IA2017)*	*Update plus at-sea data pilot*	*update*	*new*	
B 3 - Marine bird breeding success	Common	Ian Mitchell (UK), Volker Dierschke (DE)	*update* *(R1 data in IA2017)*	*update*	*update*	*new*	

[5] ICES operate a 3-year limited tenure on the chairs of each of their working groups. This has not been applied, as yet, to JWGBIRD.

Indicator name	Type	Lead	Region I	Region II	Region III	Region IV	Region V
B5 - Marine bird bycatch	Candi-date	Volker Dierschke (DE), Signe Christensen-Dalsgaard (NO), Sven Koschinski (DE)	*Pilot*	*Pilot*	*Pilot*	*Pilot*[6]	*Pilot* [6]
B7 - Marine bird habitat quality	Candi-date	Volker Dierschke (DE)		*Pilot*			

Some outputs for the OSPAR QSR2023 will be delivered through a project partly funded by the European Maritime and Fisheries Fund (EMFF) and the UK Joint Nature Conservation Committee (JNCC) – NEA-PANACEA (Northeast Atlantic Project on biodiversity and eutrophication assessment integration and creation of effective measures). The work on marine birds under NEA-PANACEA will be led by Ian Mitchell and Volker Dierschke (co-chairs of JWGBIRD at the beginning of the work programme) and will aim to deliver an assessment of the OSPAR Common Indicator B3 – marine bird productivity and a Thematic Assessment of marine birds for the OSPAR QSR2023. As part of the wider delivery of NEA-PANACEA, OSPAR-nominated members of JWGBIRD will be invited to join members of the other OSPAR biodiversity expert groups at the SUPER-COBAM meeting in October 2021. SUPER-COBAM will address common issues being faced by the different expert groups in delivering indicator assessments and thematic assessments for the OSPAR QSR 2023.

OSPAR has identified a need to prioritize work on measures and actions to improve the status of seabirds to allow their recovery. JWGBIRD will be involved in developing this work in the period covered by this work programme.

HELCOM

JWGBIRD reports to the HELCOM State and Conservation working group. JWGBIRD is required to collaborate, as needed, with national leads and co-leads of HELCOM indicators related to seabirds and with national leads of HELCOM recommendations, including but not limited to:

Recommendation 34E-1 'Safeguarding important bird habitats and migration routes in the Baltic Sea from negative effects of wind and wave energy production at sea', and

Recommendation 37-2 'Conservation of Baltic Sea species categorized as threatened according to the 2013 HELCOM red list'.

The group can also work on other HELCOM projects that support the commitments mentioned above.

Key HELCOM work areas for JWGBIRD during 2021–2023 will be the preparation and delivery of bird assessments for the next holistic assessment of the Baltic Sea (HOLAS III, see Table 2). One bird indicator addressing bird and mammal bycatch in fishing gear is partly funded by EMFF in the project HELCOM BLUES (HELCOM biodiversity, litter, underwater noise and effective regional measures for the Baltic Sea).

[6] Development of a pilot assessment in Regions IV and V may be constrained by a lack of data. This issue is being explored by the indicator leads.

Table 2. Indicators assessments to be delivered by JWGBIRD for HELCOM HOLAS III.

Indicator name	Type	Lead	Region V
Number of drowned mammals and waterbirds in fishing gear	Core	Sven Koschinski (DE), Volker Dierschke (DE),	*update*
Abundance of waterbirds in the breeding season	Core	Volker Dierschke (DE), Fredrik Haas (SE)	*update*
Abundance of waterbirds in the wintering season	Core	Volker Dierschke (DE), Fredrik Haas (SE)	*update*
Waterbird habitat quality	Candidate	Volker Dierschke (DE)	*pilot*

ICES

JWGBIRD reports at present to ICES ACOM. The group's task list will be reviewed annually by both ICES ACOM and SCICOM, but substantive comments will only be taken in relation to issues that are helping delivery of the ICES strategy or require knowledge creation/synthesis to respond to the advice request by ICES. At present such work includes:

- Development of an ICES region wide (i.e. across HELCOM/OSPAR) set of operational indicators in line with the Transparent Assessment Framework TAF and follow FAIR (findable, accessible, interoperable, and reusable) data principles.
- Assessment of effects of anthropogenic activities on marine birds other than incidental bycatch / fisheries).
- Assemble bird bycatch data and qualitative information from other sources not covered by ICES Working Group on Bycatch of Protected Species (WGBYC; incl. strandings, entanglement, interviews, research projects, national/local monitoring).
- Determine and further advance methods to assess the resilience of protected bird species to bycatch and make these available to WGBYC. Provide input to ICES advisory products.

The bycatch-relevant work of JWGBIRD will be according to the ICES roadmap for bycatch advice. Contribution to advice will follow the Guide to ICES advisory framework and principles.

Annex 2 – Task List

The JWGBIRD task lists are typically reflective of the autumn-to-autumn work of the group, however delivery deadlines for tasks can also be related to schedules in HELCOM, OSPAR or ICES.

The task list is updated annually by the co-chairs and is a 'living document'. The task list is used as a communication tool towards OSPAR, HELCOM and ICES.

Task	Lead	Started in the year	Included in JWGBIRD report	Other outputs	Delivery to specific meeting/ date
A) Impacts on populations of extreme events incl. oil spills and extreme weather. {Deferred to meeting in Autumn 2021 due to the COVID-19 pandemic}	Maite Louzao Arsuaga	2021			
B) Impacts of litter on seabirds (i.e. ingestion, entanglement) – reviewing evidence and proposing further research priorities.	David Fleet	2021	Yes2020/21	?	
C) Plan bird assessments for OSPAR QSR2023:	Ian Mitchell				
C-1) Agree format of datacall. {Datacall to be issued Sep-Dec 2020}	Ian Mitchell	2020	Yes – summary of data returns and append data format – 2020/21		
C-2) Set baseline values for B1 marine bird abundance indicator {Retain current baselines (start of time-series) – defer selection of more objective baselines to next indicator update}	Ian Mitchell	Not conducted due to COVID			
C-3) Draft proposals for a pilot assessment of at-sea abundance data in southern North Sea.	Nele Markones and Eric Stienen		Yes – draft results – 2020/21	Papers to OSPAR BDC and COBAM	COBAM 31/11/20 BDC 22/03/21
C-4) Review progress on revising indicator B3 marine bird breeding success	Morten Frederiksen and Tycho Anker-Nilssen, Ian Mitchell	2020	Yes - *brief update on decisions and progress in OSPAR – 2020/21*	Proposal for B3 thresholds	BDC 22/03/21
C-5) Draft proposal for a pilot assessment of B5 seabird bycatch mortality.	Signe Christensen-Daalsgaard Sven	2020	Yes - *brief proposal on what could be included*	*Proposal for COBAM 2020 and BDC 2021*	COBAM 31/11/20

Task	Lead	Started in the year	Included in JWGBIRD report	Other outputs	Delivery to specific meeting/ date
	Koschinski, Volker Dierschke		*in the pilot assessment of B5 and how it will be produced, including resource requirements and working arrangements with ICES WGBYC*		BDC 22/03/21
C-6) Draft proposal for a pilot assessment of B6 Marine Bird Distribution {Deferred until at least 2022 due to funding and data constraints}	TBC	Deferred to 2022			
C-7) Draft proposal for a new candidate indicator and pilot assessment of offshore habitat quality (*merge with task D-3)*	Volker Dierschke	2020	Yes – draft results – 2020/21	proposal to COBAM 2020 and BDC 2021	COBAM 31/11/20 BDC 22/03/21
D) Plan bird assessments for HELCOM HOLAS III	Volker Dierschke				
D-1) Agree procedures for waterbird abundance indicators.	Volker Dierschke and Ainars Aunins (TBC)	2020	Yes – brief update on decisions and progress – 2020/21		no
D-2) Discuss possibilities to expand waterbird assessments to other MSFD criteria.	Volker Dierschke	2020	No	No	no
D-3) Draft proposal for a new candidate indicator and pilot assessment of offshore habitat disturbance (*merge with task C-7)*	Volker Dierschke	2020	Yes – draft result – 2020/21s	Candidate Indicator proposal to SandC 2021	Yes HELCOM to specify date
E) Review of results from offshore (at-sea) surveys of the Baltic and planning future work.	Ainars Aunins and Ib Krag Petersen		Possibly?		
F) Develop methods for measuring and communicating confidence in OSPAR and HELCOM assessments. Lead.	Ian Mitchell		Yes	No	
G) Support ICES advisory services	Nele/ICES Sec?	2021	Possibly	G-1) Participation in dedicated workshop in 2022	no

Task	Lead	Started in the year	Included in JWGBIRD report	Other outputs	Delivery to specific meeting/ date
G-1) Request from NEAFC on bird bycatch: Present request and progress at JWGBIRD 2021 and provide feedback. G-2) In support of the ICES roadmap for bycatch advice, assemble bird bycatch data and qualitative information from additional sources than by WGBYC (incl. strandings, entanglement, interviews, research projects, national/local monitoring). G-3) Assessment of effects of anthropogenic activities on marine birds other than incidental bycatch/fisheries				G-2) Report to ICES WGBYC	
G') Methods development G'-1) Determine and further advance methods to assess the resilience of protected bird species to bycatch					
H) Migration of ESAS database to ICES Data Centre Subgroup of JWGBIRD working on data policy, model and format.	Nele/Carlos (ICES)	2020	Possibly	Database	
I) Conduct Indicator Assessments for OSPAR QSR 2023 (see table 1)					
I-1) B1 - Marine bird abundance (update of common indicator)	Ian Mitchell / Volker Dierschke	2021	Yes 2021/22	*Draft to COBAM Dec 2021* *Final to BDC 2022*	*COBAM Dec 21* *BDC Mar/Apr 2022*
I-2) B1 - Marine bird abundance (PILOT using at-sea data)	Nele Markones				
I-3) B5 - Marine bird bycatch (PILOT)	Volker Dierschke / Signe Christensen-Dalsgaard, Sven Koschinski				

Task	Lead	Started in the year	Included in JWGBIRD report	Other outputs	Delivery to specific meeting/ date
I-4) B7 - Marine bird habitat quality (PILOT)	Volker Dierschke				
I-5) B 3 - Marine bird breeding success	Ian Mitchell / Morten Frederiksen	2021	Yes 2021/22	*Draft to COBAM 2021* *Final to BDC 2022* *NEA-PANACEA reports*	*COBAM Dec 21* *BDC Mar/Apr 2022*
J) Conduct OSPAR Thematic Assessment of marine birds for QSR 2023	Ian Mitchell / Volker Dierschke	2021	Yes 2022/23	*Draft to BDC 2022* *Final to BDC 2023* *NEA-PANACEA reports*	*BDC Mar 2022* *BDC Mar 2023*
K) Develop and submit - *OSPAR Marine Bird Recovery Action Plan (Task S5.O3.T1 under OSPAR NEAES 2020-30 Implementation Plan)*	Matt Parsons/ Ian Mitchell / Volker Dierschke	2021	Yes 2023/24	*Drafts to BDC 2022 and 2023* *Final to OSPAR 2023*	*BDC Mar 2022 and Mar 2023* *OSPAR JUN 2023*
L) Organize JWGBIRD-Plus	Ian Mitchell / Matt Parsons	2022	Yes 2022/23	*NEA-PANACEA Reports*	*COBAM Dec 2022*

Supporting information

Task L - In Spring 2022 an additional meeting of JWGBIRD will be held, as part of the NEA-PANACEA project (details below). This extra meeting, called 'JWGBIRD-PLUS' will be hosted by JNCC in Aberdeen, UK and will be open to all JWGBIRD members, plus invited seabird experts from countries in the Mediterranean and Black Sea regions, who are also assessing the status of marine birds as part of the Marine Strategy Framework Directive. JWG-BIRD-PLUS will identify the synergies and differences between GES assessments of marine birds in the four European Regions. This will provide capacity to involve and promote dialogue and cooperation with relevant stakeholders across the four regions. It will also create an action plan detailing priorities for future co-working and establishing best practice.

Intersessional: Support HELCOM conservation initiatives and assessments	Volker Dierschke	No	Yes – brief activity report	*ad hoc responses required to various questions from Secretariat.*	

Intersessional: Publish guidance on best practices, methods and reporting for at-sea monitoring of seabirds in the Baltic Sea	Nele Markones	Summer 2020?		No	HELCOM SandC Sep 2020	
Intersessional: Review assessments of OSPAR Threatened and Declining Species *Thick-billed Murre (Uria lomvia)*	Ian Mitchell	2020		No	*Review of draft assessments to ICG-POSH in Nov 2020 and March 2021*	*ICG POSH 20/11/20*
fuscus subspecies of Lesser Black-backed gull (Larus fuscus fuscus -NO}	Ian Mitchell	No	2021	No	*Review of draft assessments to ICG-POSH in March 2021*	*ICG POSH 05/03/21*
Roseate tern (PT), Balearic shearwater (ES), Black-legged kittiwake (UK), Iberian guillemot (ES/PT)	Matt Parsons	No	2021	No	*Review of draft assessments to ICG-POSH in Nov 2021*	*ICG POSH* *Nov 2021*
Ivory gull, Macaronesian shearwater (*Puffinus baroli*), Steller's eider	Matt Parsons	No	2023	No	*ICG-POSH 2023*	*ICG POSH Nov 2023*

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