AGREEMENT ON THE CONSERVATION OF AFRICAN-EURASIAN MIGRATORY WATERBIRDS

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"Making flyway conservation happen"

REVIEW OF THE STATUS, THREATS AND CONSERVATION ACTION PRIORITIES FOR THE SEABIRD POPULATIONS COVERED BY THE AGREEMENT

Introduction

This scoping review was initiated with the view to inform prioritisation and streamlining of AEWA's seabird work. It involves a short overview of the status of AEWA seabird species and threats to these species and also outlines what various stakeholders are already doing, existing key gaps, and where AEWA could play a valuable role

It was commissioned to BirdLife International, but due to late availability of funding, the timeline of the project did not match with the timeline of production of the other MOP6 documents thus a rough initial outline was presented to and approved by the Technical Committee (TC) at its 12th meeting in March 2015. Since then, the TC has been closely involved in the process, which has led to the development of the current second draft, which was reviewed by the TC and approved for submission by both the Technical and Standing Committees by correspondence in September 2015.

Action requested from the Meeting of the Parties

The Meeting of the Parties is invited to note this review and take its conclusions and recommendations into account in the decision-making process (draft Resolution AEWA/MOP6 DR9 *Improving the Conservation Status of African-Eurasian Seabirds*).

Review of the Status, Threats and Conservation Action Priorities for the Seabird Populations Covered by the Agreement

REPORT TO THE AFRICAN-EURASIAN WATERBIRD AGREEMENT
Final Draft- September 2015

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Acronyms and Abbreviations

ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACAP	Arctic Contaminants Action Programme
AEWA	African-Eurasian Waterbird Agreement
ATF	Albatross Task Force
CAFF	Conservation of Arctic Flora and Fauna
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
FAO	Food and Agriculture Organisation (of the United Nations)
HELCOM	Helsinki Convention
IBA	Important Bird and Biodiversity Area (including marine IBAs)
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IUCN	International Union for the Conservation of Nature
NPOA	National Plan of Action
SEAFO	Southeast Atlantic Fisheries Organisation
SWIOFC	Southwest Indian Ocean Fisheries Commission
RFMO	Regional Fisheries Management Organisations
PAME	Protection of the Arctic Marine Environment
OSPAR	Convention for the Protection of the North East Atlantic marine environment

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Executive summary

Eighty-four seabird species which are listed under Annex 2 of the African-Eurasian Waterbird Agreement (AEWA) are considered in this review, which covers the full geographic area of the Agreement. This review aims to synthesise and present the existing information on current conservation status and threats to listed seabird species (see Appendix I), and identify the relevant conservation actions, knowledge gaps and priorities for future work.

Within the AEWA region, eight species are considered threatened, listed as either Vulnerable or Endangered on the IUCN Red List, a further five are considered 'Near Threatened' and the global population of twenty nine species are in decline. The specific threats and their impact on seabirds differ across the different biogeographic regions. Furthermore, our understanding of the threats and their impact is greatly hampered by the gaps in knowledge on seabird ecology, distribution at sea and their interaction with threatening processes. Despite these knowledge gaps, there is a great deal of consistency across the AEWA region on the key threats which can be identified as coupled climate/human impacts on prey (forage fish, ecosystem impacts), bycatch in fishing gear, human harvesting, invasive species predation, mortality from oil spills and contaminants and disturbance and mortality from at-sea developments such as from offshore energy and mining.

The greatest concerns arising from this review includes the lack of scientific data to enable quantification of important causes of seabird mortality, such as bycatch and harvesting. Furthermore there is a major gap within the existing international and regional frameworks to enable a flyway scale overview of seabird mortality caused by human activities. This has left the Governments, scientists and managers of human activities unable to quickly respond to the plummeting populations of some seabird species. It has also restricted the making of informed and cohesive decisions on sustainable use of seabirds where this has traditionally occurred, or the management of coastal and marine activities to mitigate these impacts on seabirds.

This review identifies the following cross cutting recommendations for regional conservation action across the entire AEWA region:

- Identification of pelagic sites for seabirds through tracking studies, and protection of these sites under existing marine protected area frameworks in national, regional and international fora.
- Identification of coastal sites for seabirds, particularly in the Arctic and Africa and protection under existing protected area frameworks and national processes.
- Consideration of existing protected areas in the context of climate change and seabird ecology.
- Quantification of seabird mortality from main sources (e.g. harvesting and bycatch) and incorporation into flyway-scale analysis to inform national and regional decision making on 'sustainable use' of seabirds.
- Monitor seabird bycatch in all types of fisheries, with a priority on gillnet bycatch, and develop effective mitigation solutions to gillnet bycatch.
- Understand the scale and impact of invasive predators on seabird populations across the region.
- Provide a coordination point for island eradication projects and map out a strategy for eradications across the region.
- Understand the scale and impact of contaminants, including marine litter on seabird species (other than Fulmar)
- Develop sub-regional oil spill mitigation strategies and post-spill monitoring schemes across the different AEWA biogeographic regions

In furthering AEWA's seabird conservation work, and in implementing the above recommendations, it is necessary to consider the existing multilateral environmental agreements and mechanisms concerned with marine conservation and the management of human activities and threats. These

MEAs offer an opportunity for AEWA to collaboratively work to conserve seabirds across the African-Eurasian flyway. The most relevant of these processes have been identified within each regional section; however this review has not provided recommendations for engagement with individual MEAs. This review recommends that a strategic assessment of these MEAs is carried out to clarify the following key questions:

1) What is the exact remit of the MEA, and how does it fit within AEWA's goals for seabird conservation?
2) How is the MEA currently working? Is it currently effective for seabird conservation, or could it become more so?
3) Could AEWA engage effectively in this process?

There are some clear opportunities for AEWA to engage with existing MEAs across a number of conservation themes and threat management, for example in engaging Regional Fisheries Management Organisations on seabird bycatch, or with regional conventions on harvest data recording and sustainable seabird harvesting advice. In each case, AEWA's role could include the following:

- Provide guidance to national governments on the existing processes and share best practice
- Encourage national governments to engage more closely in existing MEAs to ensure that seabird conservation outcomes are maximised across the AEWA region.
- AEWA Secretariat engagement with the existing MEAs, producing Memoranda of Understanding for joint work and participation in meetings etc.

There is a clear need for the AEWA Secretariat to convene a multi-stakeholder workshop, in order to:

- Define and prioritise AEWA's engagement with seabird conservation across the region and in respect to existing international and regional fora
- Develop a strategic action plan for future AEWA engagement in seabird conservation, including the prioritisation of conservation actions targeting specific threats within AEWA sub-regions.
- Highlight the current gaps in conservation for seabirds covered by the Agreement and encourage Parties and other stakeholders to strengthen national level work on marine protected areas, pollution, sustainable harvesting, marine spatial planning, seabird bycatch monitoring and mitigation and fisheries management.
- Provide an opportunity to strengthen existing networks and cooperation with international and regional processes and management bodies, including the development of specific resolutions of cooperation between AEWA and other agreements and bodies.

Introduction

Background and Context

Seabirds are globally one of the most threatened groups of birds (Croxall *et al*. 2012). For many species, large periods of their life cycle are lived out at sea, where increasingly intensive human activities expose them to a range of threats, causing direct mortality, reproductive failure and disturbance.

Various international conventions and agreements exist which either directly or indirectly deal with a number of seabird species or with their habitats, or with specific threats (e.g. oil spills, bycatch, marine and coastal planning). Specific multilateral agreements for seabird conservation fall within the remit of the Convention on Migratory Species (CMS), and its daughter agreements. As the global framework for conservation of migratory species, CMS aims to protect terrestrial, aquatic and avian migratory species throughout their range. The CMS currently lists 82 species of seabirds, including albatrosses, petrels and shearwater species.

While there are provisions in international law regarding some threats to seabirds, there is no international treaty in place, which is specifically focused on the conservation of the seabird species. The partial exception is ACAP (the Agreement on the Conservation of Albatrosses and Petrels)[1], which only covers a sub-set of the migratory seabirds

ACAP has thirteen contracting parties and focuses on 31 species of albatross, shearwater and petrel[2]. There are three expert working groups, including seabird bycatch, population and conservation status, and taxonomy. The population and conservation working group includes a focus on gaps in scientific and ecological knowledge and conservation. The seabird bycatch work includes the production of best practice bycatch mitigation factsheets for fishing fleets[3], the development of Memoranda of Understanding with Regional Fisheries Management Organisations (RFMOs) and participation at RFMO meetings[4]. ACAP is able to provide coordination on global conservation issues to the seabirds covered by the agreement. In addition ACAP provides expert advice to national governments and are able to provide strategic direction on research and conservation priorities and facilitate the implementation of conservation projects.

Despite its considerable expertise and successes in seabird conservation, ACAP's remit does not include other migratory seabird species. For these other seabird species a global, strategic and coordinated approach on their conservation is missing. The African Eurasian Waterbird Agreement (AEWA) identified this gap, and the opportunity to bridge this gap by including the migratory seabird species occurring within the AEWA area, in its species list. Progressive discussions at a number of Meetings of the Parties (2nd, 3rd, 4th MOPs) lead to the 2008 expansion of the list of species covered by the Agreement to include a total of 84 seabird species (see Appendix I).

The AEWA Technical Committee carried out an analysis of the main broad threats to seabirds and the existing synergies between MEAs and seabird conservation to identify AEWA's potential role in this arena (AEWA Technical Committee, 2008).[5] The main findings were that AEWA could play an important role in working with other relevant international organisations to make provisions under their mandate more efficient and ensure flyway scale coherence to seabird conservation. By

[1] Agreement on the Conservation of Albatross and Petrels http://www.acap.aq/en
[2] ACAP species list, http://www.acap.aq/en/acap-species/307-acap-species-list/file
[3] The seabird bycatch factsheets are developed in collaboration with BirdLife International http://www.acap.aq/en/bycatch-mitigation
[4] See ACAP's RFMO Interaction Plan http://www.acap.aq/en/advisory-committee/ac5/ac5-meeting-documents/96-ac5-doc-29-a-review-of-acaps-strategy-for-engaging-with-rfmos-e1/file
[5] 8th Meeting of the Technical Committee (2008) Potential role of the Agreement in the conservation of seabirdshttp://www.unep-aewa.org/sites/default/files/document/tc_inf_8_1_aewa_role_conservation_seabirds_0.pdf

expanding its remit into seabird conservation AEWA would develop into a central point of knowledge on seabird species status and threats, as well as facilitate the improvement of data collection and the sharing of best practice for conservation.

Aims of review

In order to further develop AEWA's work programme in seabird conservation, a strategic review on the conservation status, threats and conservation action was necessary to understand the current priorities in this field. This review therefore aims to synthesise and present the existing information on current conservation status and threats to the eighty four seabird species (see Appendix I) which are listed under the African-Eurasian Waterbird Agreement (AEWA), and identify the relevant conservation actions, knowledge gaps and priorities for future work.

The AEWA region, extending from the high Arctic, to the Atlantic and Indian Ocean waters below Southern Africa, includes a diverse range of eco-regions and habitats from polar, temperate and tropical. Across this region there are thirteen different seabird families[6], from Auks to the African Penguin, with highly diverse ecologies.

Globally, seabirds are the most threatened group of birds and they face important threats both on land, and at sea (Croxall *et al*. 2012) [7]. Within the AEWA region, eight species are considered threatened, listed as either Vulnerable or Endangered on the IUCN Red List, a further five are considered 'Near Threatened' and the global population of twenty nine species are in decline. These seabirds face threats across their flyways, impacting them during their breeding, passage and non-breeding life stages. There is a strong need to understand the nature, severity and scale of these threats at both local and regional levels, so that conservation programmes can work across flyways to reduce cumulative impacts.

To direct activities and resources strategically to the most critical problems, it is also necessary to understand what work is already taking place, and identify the key organisations delivering relevant conservation action. This review identifies conservation work of relevance to the AEWA listed seabird species, which is being carried out by Multi-lateral Environmental Agreements, Regional Conventions, national Governments and by the BirdLife International Partnership, and associated seabird experts. The review identifies the major conservation actions which are currently lacking, as well as the main knowledge gaps and research needs. This approach is designed to assist in developing a strategic vision for each of the biogeographic regions covered by the Agreement. Lastly, the review makes some suggestions for AEWA's role in addressing the threats and conservation needs across the region.

[6] Based on accepted BirdLife taxonomic definitions of 'seabirds'.
[7] Croxall, J. P. *et al*. Seabird conservation status, threats and priority actions: a global assessment. Bird Conservation International 22, 1–34 (2012).

Geographic scope of review

This review considers species threats and relevant conservation action both on land and at sea across the entire AEWA area, as presented in Figure 1 below. The emphasis is on the marine habitat however, and so specific threats in freshwater environments are not covered in detail. Where specific threats are of particular importance outside the AEWA region these are also identified.

As seabirds spend large amounts of time at sea, the AEWA regions have been sub-divided according to marine biogeographic regions, roughly following Spalding *et al*. (2007) (Table 1 & Figures 2 & 3) where appropriate and practical. Five main large biogeographic areas have been used within this review: 1) Arctic/sub-Arctic, 2) Temperate Northern Atlantic 3) Tropical Atlantic 4) Temperate Southern Africa 5) Western Indo-Pacific.

This review presents information on seabirds, their status, threats and conservation action within each of these regions.

Figure 1. AEWA area

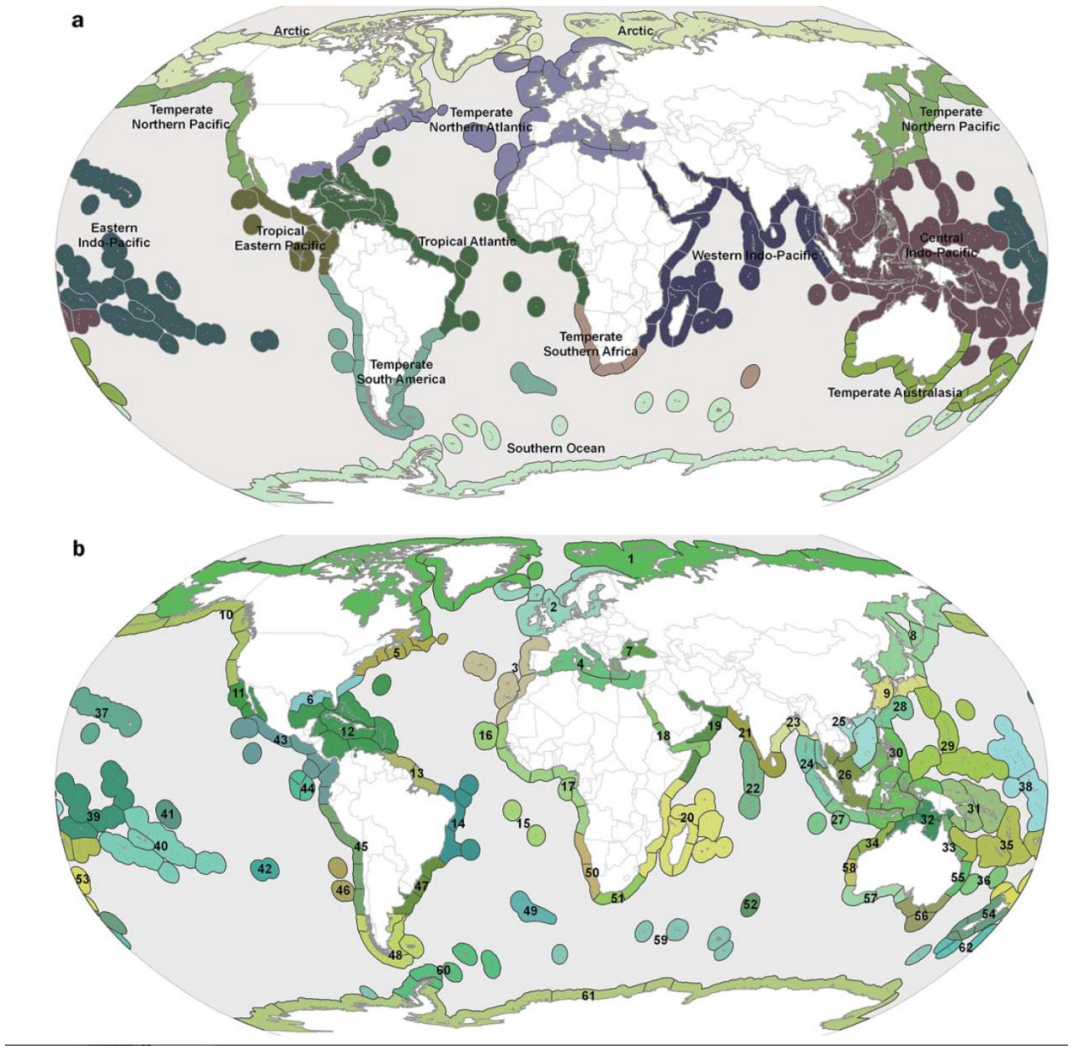

Figure 2. Global Marine Biogeographic Regions. Adapted from Spalding *et al*. (2007)

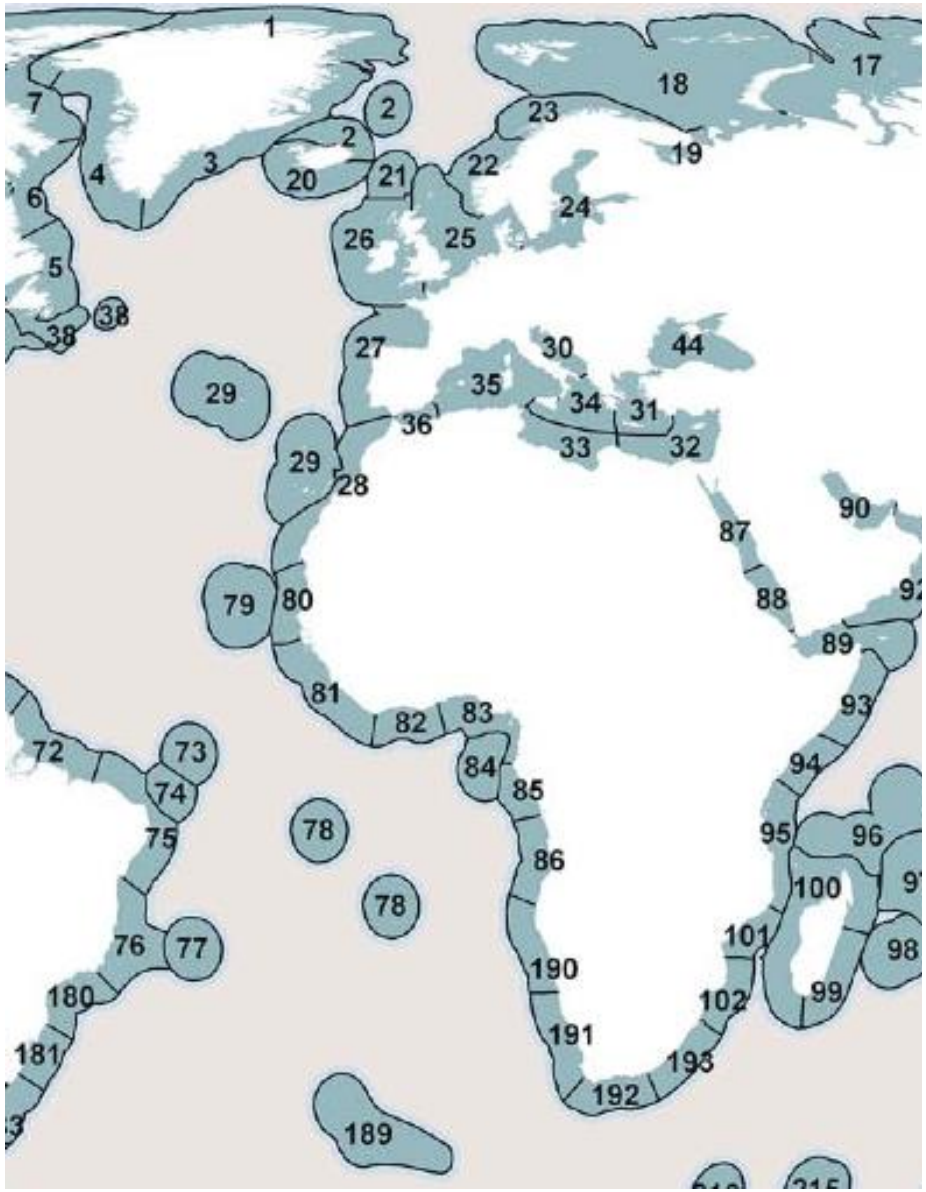

Figure 3. Marine eco-regions relevant to AEWA region. Adapted from Spalding *et al*. (2007)

Table 1. Marine Biogeographic Areas and ecoregions adapted for regional review of AEWA seabirds. (numbers relate to Spalding *et al*. 2007 marine ecoregions- see figure above)

Arctic: • 1. North Greenland • 3. East Greenland Shelf • 4. West Greenland Shelf • 7. Baffin Bay–Davis Strait • 2. North and East Iceland • 17. Kara Sea • 18. North and East Barents Sea • 19. White Sea • 23. Northern Norway and Finnmark • Northern Finland & Northern Russia	**Sub-Arctic** • 20. South and West Iceland • 21. Faroe Plateau • 22. Southern Norway
Temperate Northern Atlantic *Northern European Seas* • 24. Baltic Sea & Baltic Countries • 25. North Sea (includes UK, Southern Norway, Belgium, France, Netherlands, Germany & Denmark) • 26. Celtic Seas (includes Ireland, NW France) *Lusitanian* • 27. South European Atlantic Shelf (includes France, Spain, Portugal) • 28. Saharan Upwelling (Morocco, Western Sahara) • 29. Azores, Canaries, Madeira *Mediterranean Sea* • 30. Adriatic Sea • 31. Aegean Sea • 32. Levantine Sea • 33. Tunisian Plateau/Gulf of Sidra • 34. Ionian Sea • 35. Western Mediterranean • 36. Alboran Sea *Black Sea* • 44. Black Sea (includes Turkey, Romania, Bulgaria, Ukraine, Russia, Georgia)	**Western Indo-Pacific** *Western Indian Ocean* • 94. Northern Monsoon Current Coast (Kenya, southern Somalia) • 95. East African Coral Coast (N. Mozambique, Tanzania) • 96. Seychelles • 97. Cargados Carajos/Tromelin Island • 98. Mascarene Islands • 99. Southeast Madagascar • 100. Western and Northern Madagascar • 101. Bight of Sofala/Swamp Coast (Mozambique) • 102. Delagoa (N. South Africa, Swaziland, Mozambique) *Red Sea and Gulf of Aden* • 87.Northern and Central Red Sea (Egypt, Saudi Arabia, Jordan, Israel) • 88. Southern Red Sea (Sudan, Saudi Arabia, Eritrea, Yemen, Djibouti • 89. Gulf of Aden (Somalia, Yemen) *Somali/Arabian* • 90. Arabian (Persian) Gulf • 91. Gulf of Oman 92. Western Arabian Sea • 93. Central Somali Coast

Temperate Southern Africa	**Tropical Atlantic**
Benguela • 190. Namib (Namibia) • 191. Namaqua (Namibia, South Africa) *Agulhas* • 192. Agulhas Bank (South Africa) • 193. Natal (South Africa)	*West African Transition* • 79. Cape Verde • 80. Sahelian Upwelling (Mauritania) *Gulf of Guinea* • 81. Gulf of Guinea West (Senegal – Liberia) • 82. Gulf of Guinea Upwelling (Cote d'Irvoire- Ghana) • 83. Gulf of Guinea Central (Togo-Cameroon) • 84. Gulf of Guinea Islands (Sao Tome & Principe) • 85. Gulf of Guinea South (Equatorial Guinea- DR Congo) • 86. Angola *St. Helena and Ascension Islands* • 78. St. Helena and Ascension Islands

AEWA listed seabird species:

Based on BirdLife accepted taxonomy there are 84 species of seabird, from 13 families occurring within the AEWA region and covered by the Agreement. A complete list of species considered within this review, and their global conservation status is available in Appendix I . Table 2 below provides a summary of the included seabird families, with information on the number of threatened species & globally decreasing populations. Species which are listed as threatened, or with declining populations have received particular attention in this review.

Table 2, AEWA listed seabird species by family and overview of conservation status

Family	No. Species included in review	No. globally threatened (VU, EN, CR)	No. with decreasing population trends	No. Stable populations	No. with increasing populations	No. unknown population trends
Alcidae	6	0	2	0	4	0
Anatidae	10	3	5	1	2	2
Gaviidae	4	0 (1 NT)	4	0	0	0
Fregatidae	2	0	2	0	0	0
Laridae	39	0 (2 NT)	13	14	8	4
Pelecanidae	1	0				1
Phaethontidae	3	0	2	1	0	0
Phalacrocoracidae	5	3 (1 NT)	3	0	1	0
Podicipedidae	4	0	2	0	0	2
Scolopacidae	2	0	2	0	0	0
Stercorariidae	2	0	0	2	0	0
Spheniscidae	1	1	1	0	0	0
Sulidae	3	1	2	0	1	0

Seabird conservation status, threats and conservation action in the Arctic and sub-Arctic

Figure 4. Arctic and sub-Arctic area focal area. Adapted from Spalding *et al*. (2007)

There are 38 seabird species listed under AEWA which occur regularly within the Arctic and sub-Arctic region (see Table 3). The global populations of over half of these species are considered to be decreasing. One species (Velvet Scoter) is listed as Endangered, and two species (Long-tailed Duck and Steller's Eider) are listed as Vulnerable on the IUCN/BirdLife Red List. The global Red List for birds will be updated at the end of 2015, with preliminary proposals for 'uplisting' of a number of AEWA listed seabird species.[8] The pan-European Red List of Birds (BirdLife, 2015) has listed the Atlantic Puffin as Endangered, the Long-tailed Duck, Velvet Scoter, Greater Scaup and Common Eider, Yellow-billed Loon, Common Loon, and Black-legged Kittiwake as Vulnerable, the Common Murre, Razorbill, Red-breasted Merganser, European Herring Gull and Horned Grebe as Near Threatened.

Table 3, AEWA seabird species in AEWA region of Arctic & Sub-Arctic, global & regional population trends and life stages spent in region. B= Breeding, non-B= Non-Breeding. (Most important countries/areas for breeding colonies/winter aggregations indicated with *)

Family	Species	Global Population trend & Global Red List Status	European Red List Status & Population Trend	Period of life-cycle in region			
				Arctic (B)	Arctic (non-B)	Sub-Arctic (B)	Sub-Arctic (non-B)
Alcidae	Atlantic Puffin	LC-↓	EN↓	y *Svalbard, Canada	y	y *Iceland, Norway	y
	Common Murre	LC- ↑ (US)	NT	y *Svalbard	y	y *Norway, Iceland, Faroes, Scotland	y
	Thick-billed Murre	LC-↑ (US)	NT	y (*Svalbard, Greenland; Canada)	y	y	y
	Little Auk	LC- ↓	LC	y * Greenland, Svalbard	y	n	y

[8] Globally Threatened Bird Forum, 2015, Initial proposal for: Razorbill as Near Threatened, http://www.birdlife.org/globally-threatened-bird-forums/2015/07/razorbill-alca-torda-uplist-from-least-concern-to-near-threatened/ , Atlantic Puffin as Vulnerable http://www.birdlife.org/globally-threatened-bird-forums/2015/07/atlantic-puffin-fratercula-arctica-uplist-from-least-concern-to-endangered/ , Common Eider as Near Threatened http://www.birdlife.org/globally-threatened-bird-forums/2015/07/common-eider-somateria-mollissima-uplist-from-least-concern-to-near-threatened-or-vulnerable/, Horned Grebe as Vulnerable http://www.birdlife.org/globally-threatened-bird-forums/2015/07/horned-grebe-podiceps-auritus-uplist-from-least-concern-to-vulnerable/

Family	Species	Global Population trend & Global Red List Status	Regional Red List Status & Population Trend	Period of life-cycle in region			
				Arctic (B)	Arctic (non-B)	Sub-Arctic (B)	Sub-Arctic (non-B)
Alcidae	Razorbill	LC-↑	LC	y *Greenland	y	y * Norway, Iceland	y
	Black Guillemot	LC-↑ (US)	LC	y *Svalbard, Canada, Russia, Greenland	y	y (Iceland, Faroes)	y
Anatidae	Common Eider	LC-Unkwn.	LC	y	y	y	y
	Steller's Eider	VU- ↓	VU	y (Russia Central Asian)	y	n	y
	King Eider	LC- ↓	VU	y	y	n	y
	Common scoter	LC-Unkwn.	LC	y	y	y	y
	Velvet Scoter	EN-↓	LC	y *N. Norway, Finland, Russia	y	y	y
	Goosander	LC-↑	LC	y	y	y	y
	Red-breasted Merganser	LC-↑	VU	y	y	y	y
	Greater Scaup	LC-↓	LC	y	n	y	y
	Common Goldeneye	LC-Stable	NT	y	y	y	y
	Long-tailed Duck	VU	VU	y	y	y	y
Gaviidae	Arctic Loon	LC- ↓	LC	y	n	y	y
	Yellow-billed Loon	NT- ↓	VU	y	n	n	y
	Common Loon	LC-↓	VU	y	y	y	y
	Red-throated Loon	LC-↓	LC	y	y N.Norway	y	y
Laridae	Arctic Tern	LC-↓	LC	y	n	y	n
	European Herring Gull	LC-↓	NT	y	n	y	y
	Sabine's Gull	LC-Stable	LC	y	n	n	n
	Iceland Gull	LC-Stable	NT	y	n	n	y
	Black-legged Kittiwake	LC-↓	LC	y	y	y	y
	Glaucous Gull	LC-Stable	LC	y	y	y	y
	Great Black-backed Gull	LC-↑	LC	y	y	y	y
	Lesser Black-backed Gull	LC-↑	LC	y	n	y	n
	Black-headed Gull	LC-↓	LC	y	y	y	y

Family	Species	Global Population trend & Global Red List Status	Regional Red List Status & Population Trend	Period of life-cycle in region			
				Arctic (B)	Arctic (non-B)	Sub-Arctic (B)	Sub-Arctic (non-B)
	Mew Gull	LC- Unkwn.	LC	y	y	y	y
Phalacrocoracidae	Great Cormorant	LC- ↑	LC	y	y	y	y
Podicipedidae	Horned grebe	LC- ↓	NT	y *N.Norway	y	y* N.Norway	y
	Red-necked Grebe	LC- ↓	LC	n	n	y S.Norway; N.Baltic States	y
Scolopacidae	Red-necked Phalarope	LC- ↓	LC	y	n	y	y
	Red Phalarope	LC- ↓	LC	y	n	y	n
Stercorariidae	Great Skua	LC- Stable	LC	y	y	y	y
	Long-tailed Jaeger	LC-Stable	LC	y	n	y	n
Sulidae	Northern Gannet	LC-↑	LC	n	y	y *Iceland	y

Key Threats in Arctic and sub-Arctic & main international conservation actions:

- *Climate change*

Climate change and its impact on marine ecosystems is recognised as a pervasive threat to most seabird species, although it remains a challenge for scientists to demonstrate direct cause and effect between changes in climate and population declines. The Arctic Ocean sea ice cover has been reduced by between 3% and 9% per decade (Serreze *et al*. 2007) with predictions that the Arctic will be ice free by 2040. Warmer temperatures have also changed the timing of snow and ice melt in the terrestrial environment. Sea temperature rise and changes in oceanographic and biotic conditions impact seabirds through breeding and foraging range shifts; changes to adult survival, timing of migration and dispersal, and breeding success (Oro 2014). There have been shifts in primary production, changes in plankton, fish and shellfish abundance (Larsen *et al*. 2014). The response of seabirds to climate change varies according to the specific impact, species ecology, and geographic region- with variability also seen between populations of the same species (Oro 2014).

The effects of climate change have been particularly pronounced in the Atlantic sector of the Arctic, with increasing influx of warm, saline Atlantic water from the West Spitsbergen Current into the Greenland Sea as well as in the waters off Iceland, leading to changes in plankton communities and decreases in sea ice (Karnovsky *et al*. 2010; Kuletz & Karnovsky, 2012)

Although it is assumed that future climate change will have an impact (either direct or indirect) on all seabird species inhabiting the Artic and sub-Arctic regions, a review of existing literature indicated that the following AEWA listed seabird species (Table 4) are most likely to be particularly threatened by climate change within the region:

Table 4, Family & Species currently known to be affected by climate change- Arctic & sub-Arctic region

Family & Species						
Alcidae	**Anatidae**	**Gavidae**	**Laridae**	**Podicipedidae**	**Scolopacidae**	**Stercorariidae**
Atlantic Puffin	Long-Tailed Duck	Yellow-billed Loon	Black-legged Kittiwake	Red necked Grebe	Red Phalarope	Long-tailed Skua
Common Murre	Common Eider	Arctic Loon	Arctic Tern	Black-necked Grebe	Red-necked Phalarope	Great Skua
Thick-billed Murre	Steller's Eider	Red-throated Loon				
Little Auk	King Eider					
Razorbill	Common scoter					
Black Guillemot	Velvet Scoter					

Shifts in Arctic spring arrival date for many of the listed species are expected under changing climate conditions, as arrival date correlates with positive or negative phases of the North Atlantic Oscillation (NAO). Range shifts are also likely, with increased northward movements predicted for many auk species, the Black-legged Kittiwake, and both of the skua species (Merkel *et al*. 2014; Fredriksen *et al*. 2013; Virkkala *et al*. 2008).

Most of the recent literature on seabird-climate interactions has focused on the impact of climate change on Auks breeding in the Arctic and sub-Arctic. Alcid behaviour is energetically costly, due to their distant foraging trips, their flying and pursuit diving. This family is therefore expected to be highly sensitive to climate fluctuations (Stempniewicz *et al*. 2007). The impacts of climate change have been investigated particularly in relation to the species' breeding season. Very little is known about the non-breeding distribution of Auk species once they leave their colonies, and therefore a detailed understanding of the threats and impacts during this stage is a key knowledge gap (Oro *et al*. 2014). The current observed impact of climate change for auk species within the Arctic and sub-Arctic appears to be most severe in relation to shifts and changes in prey species, including sandeels (*Ammodytes* spp) and clupeids such as Sprat (*Sprattus sprattus*), Atlantic Herring (*Clupea harengus*) and smelt species such as Capelin (*Mallotus villosus*) as well as copepods.

Warming sea temperatures, and the resulting changes to ice cover and ocean mixing, are predicted to change the composition and distribution of plankton communities. The Little Auk, as a planktivorous, year-round Arctic dweller, has been the focal species of a number of investigations on climate induced changes. Research carried out in the Greenland Sea found that the Little Auk's foraging conditions during the breeding season were degrading rapidly, as a result of warming sea temperatures (Karnovsky *et al*. 2010). High energy prey was in greater abundance in the colder water off Greenland in comparison to the warmer waters off Svalbard. Warmer ocean temperatures, reduction in sea ice and reduced algal growth are likely to result in reductions of the larger, more energy rich copepod species *Calanus hyperboreus* (Hovinen *et al*. 2014). In some colonies of Little Auk in Svalbard this higher quality prey item was found to be replaced by the smaller *C.finmarchicus* species, a lower quality prey item which could lead to reduced chick-rearing success (Karnovsky *et al*. 2010), future breeding failures and possible abandonment of colonies. In the recent past, Little Auk colonies in both southern Greenland and Iceland have collapsed due to changes in oceanographic conditions of prey, and it is expected that this species will shift northward as sea temperatures continue to rise (Stempniewicz *et al*. 2007).

For auks such as Common and Thick-billed Murre, Black Guillemot, Razorbill and Atlantic Puffin, which feed on forage fish (e.g. sandeels, Capelin and Atlantic Herring), climate induced shifts in prey can exert pressure on breeding success and adult survival (Oro 2014, Merkel *et al*. 2014). Other seabird species which rely heavily on forage fish include Great Skua and Black-legged Kittiwake (Engelhard *et al*. 2014) as well as Arctic Terns and Lesser Black-backed Gull (Helgason 2012). While there is currently no evidence to suggest that forage fish prey is currently limited in the high Arctic regions of Greenland, within southern Icelandic waters and in the Northern European Seas region, depletion of prey, including the collapse of sandeel stock (Helgason 2012) has occurred over a number of years and is expected to continue and extend into more northern latitudes (Merkel *et al*.2014, Fredriksen *et al*. 2013). Poor recruitment of sandeels around Iceland since 2005 is believed to be the main cause of Atlantic Puffin breeding failure- particularly in 2010 and 2011 with no chicks fledged in colonies from the Vestmannaeyjar islands (Lilliendahl *et al*. 2013). The influence of oceanographic conditions on prey recruitment is complex, and sea surface temperature may affect prey availability differently. Decreases in recruitment have been observed for sandeels and Capelin under warmer conditions, in comparison to increases in successful recruitment of Atlantic Herring (Harris *et al*. 2005).

Studies have found temporal mismatches between Atlantic Puffin breeding and peaks in prey availability (e.g. sandeels, Atlantic Herring) (Durant *et al*. 2007), despite Atlantic Puffins shifting their breeding in response to environmental cues (as measured by the NAO). Along the Norwegian coast Atlantic Herring is considered an important prey species for the Atlantic Puffin, however the drift of juvenile Atlantic Herring northwards varies between years, leading to differences in prey availability from one breeding season to the next. Poor foraging on the breeding grounds, associated with sea surface temperature has also been found to influence adult survival immediately after breeding. Reductions in prey size and energy content (e.g. sandeels) (Wanless *et al*. 2004) and shifts in prey distribution, have also led to past severe breeding failures in colonies along the Norwegian coast and in Iceland and northern United Kingdom- e.g. Shetland Islands etc. (Martin 1988, Durant *et al*. 2004, Burthe *et al*. 2012, Helgason 2012).

Climatic changes to the coastal and terrestrial Arctic and sub-Arctic environment, including vegetation shifts and changes in timing of snow and ice melt are also likely to impact seabird species in the Arctic. Changes in the timing of snow and ice melt affect the availability of breeding sites for crevice, scree and burrow-nesting species, such as the Atlantic Puffin (Mallory *et al*. 2009), although in Greenland the date of snow melt has advanced 15 days between 1996-2005, potentially facilitating early breeding (Høye *et al*. 2007, Hanssen *et al*. 2013).The Little Auk has been found to breed earlier, as warmer conditions result in ice-free areas in the Arctic tundra (Moe *et al*. 2009). In addition, the reduced foraging and breeding success predicted for the species under warmer sea temperatures could lead to physical changes in vegetation communities in inland Little Auk colonies in a feedback loop which would lead to habitat fragmentation and degradation of breeding habitat (Stempniewicz *et al*. 2007). Reductions in summer ice cover are thought to affect breeding times and breeding success of Thick-billed Murres, with more southern breeding populations in Canada demonstrating earlier breeding and lower chick growth rates (Gaston *et al*. 2005). A general shift northwards is expected for this species (Gaston *et al*. 2005). For species such as Common Eider, the earlier retreat of sea ice leads to earlier and more exposure of benthic food sources, possibly leading to greater reproductive success (Hanssen *et al*. 2013)

For seaduck species such as the Long-Tailed Duck and Common Eider, which breed in the Arctic tundra, climate induced changes to lemming (*Synaptomys spp*.) breeding cycles (Hario *et al*. 2009) are potentially exposing seaducks to increased predation from Snowy Owl, Arctic Fox, and skuas (HELCOM, Red List Factsheet; Bellebaum *et al*. 2012). This may be precipitating the huge population declines observed in the seaduck wintering areas, such as the Baltic Sea (Bellebaum *et al*. 2012). Very low numbers of juvenile Common Scoter, Long-tailed Duck, Velvet Scoter, Red-throated Loon and Black-throated Loon were observed in the Arctic tundra (Ellermaa *et al*. 2009 in Skov *et al*. 2011), although breeding success was particularly low in more northern populations. Hydrological changes within Arctic freshwater systems and in the Arctic tundra (e.g. drying out) are also likely to impact

species such as the loons, seaducks, grebes and phalaropes (Prowse *et al*. 2006) which rely on these ecosystems during the breeding season.

Precise distribution during the non-breeding season is lacking for most of the Arctic breeding seabirds, and this is an important knowledge gap which needs to be filled in order to understand which types of threats are encountered outside of the breeding season. Studies of Little Auk wintering patterns have found three main hotspot areas, including one in the Norwegian Sea off Greenland and Iceland, and one in the North West Atlantic off Newfoundland (Fort *et al*. 2013). All the tracked birds Greenlandic over-wintered off Newfoundland, whilst birds tracked from Svalbard wintered off Iceland and Arctic Canada (Fort *et al*. 2013). Little is known about how climate change might affect these Arctic and sub-Arctic areas during this season and the implications for prey and over-wintering seabirds. Severe oceanic storms, for example, are linked to the North Atlantic Oscillation (NAO), and are known to occur during winter (Dickson *et al*. 2000). The storms are particularly intense in the Norwegian and Greenland Seas during the positive phases of the NAO, and more intense towards the US and Canada during the negative phase (Dickson *et al*. 2000).Within the sub-Arctic and Northern European Seas, extreme storm events have resulted in wrecks of thousands of Auk and other seabird species, who starve to death as they are unable to forage. In Canada, extreme weather in the high Arctic was associated with large numbers of Thick-billed Murre wrecks in Newfoundland during spring (McFarlane *et al*. 2010).

In addition to those seabird species described above which are currently facing threats from climate change, a number of species are predicted to expand their ranges northwards as ice-free areas increase and sea temperatures rise in the Arctic and sub-Arctic region. Northward expansion has already been observed in the Mew Gull in Iceland (Petersen & Thorstensen 2004), Great Skua in Svalbard (Anker-Nilssen *et al*. 2000, Krasnov & Lorentsen 2000), Black-headed Gull in southernmost Greenland (Salomonsen 1979, Boertmann 1994, 2008) Lesser Black-backed Gull (Boertmann 2008, Jensen & Rasch 2009) and Great Cormorant in Greenland. As described above, benthic feeding seaducks, loons and grebes may also be advantaged by a warmer Arctic climate.

- *Hunting/egg harvesting*

Within the Arctic and sub-Arctic region, legal hunting of adult seabirds occurs in Greenland, Iceland, Svalbard, Norway, Finland, Russia and the Faroe Islands (Merkel & Barry, 2008). Seabird harvest statistics are patchy, with particularly scarce information available for Russia and the Faroe Islands. Based on government records and best estimates in recent literature, it is estimated that the legal catch of seabirds ranges between 391,000 and 741,000 seabirds harvested across the Arctic and sub-Arctic AEWA region each year (Merkel 2010; Iceland Department of Fishing, Hunting & Agriculture, 2015). Over the past three decades the available literature has reported declines in absolute numbers of birds legally caught, attributed to new hunting regulations, fewer active hunters and seabird population declines (Merkel, 2010). Within Greenland, Iceland and the Faroes the decline in harvest have been rapid, with declines of 50% in absolute number of birds caught (Merkel, 2010). Despite declines in catch, at a biogeographic scale the legal harvest level of seabirds is high. In addition high numbers of seabirds are hunted in the US Arctic and sub-Arctic Canadian region signifying that ~1 million birds within the Arctic and sub-Arctic (including beyond the AEWA region) are likely to be legally harvested each year.[9]Data on the extent of egg collection particularly the number of eggs taken, are very scarce, with potentially very high rates of harvest in some countries. Illegal hunting is also known to occur (e.g. Greenland, Russia, Canada) however the extent of this is very poorly understood. This represents a key knowledge gap for seabirds within the region. The main species legally hunted within the AEWA Arctic and sub-Arctic region are listed in Table 5 .

[9] Merkel (2010) estimates 30,000 seabirds (25 species hunted, of which Murres are most important) in Alaska.

Table 5, Country specific information on legal and illegal hunting of seabirds, including species and estimated annual harvest in the Arctic and sub-Arctic

Family	Country (Legal/Illegal harvest)													
	Greenland Legal	Greenland Illegal	Iceland Legal	Iceland Illegal	Norway Legal	Norway Illegal	Finland Legal	Finland Illegal	Russia Legal	Russia Illegal	Faroe Islands Legal	Faroe Islands illegal	Canada Legal	Canada illegal harvest
Alcidae	*Thick Billed Murre; *Little Auk; Black Guillemot; Common Murre; Little Auk	Unknwn	*Atlantic Puffin; *Common Murre *Razorbill; Thick-billed Murre	Unknwn	Thick-billed Murre; Black Guillemot	Unknwn		Unknwn	Murres (not specified)	Eggs of Thick-billed Murres taken illegally	*Atlantic Puffin; Razorbill; Common Murre;	Unknwn	*Thick-billed & Common Murre (native & non-native peoples)	Unknwn
Anatidae	*Common Eider; King Eider; Long-tailed Duck;	Unknwn	Greater Scaup; Long-tailed Duck; Red-breasted Merganser;	Unknwn	*Common Eider	Unknwn	*Common Eider	Unknwn	Common Eider; King Eider (illegal hunting?)	Eider species eggs & adults most commonly poached. Numbers not quantified		Unknwn	*Common Eider	Unknwn
Gavidae	Common Loon	Unknwn		Unknwn		Unknwn		Unknwn	Indigenous hunting permitted			Unknwn		Unknwn
Laridae	*Black Legged Kittiwake; Glaucous Gull; Great Black-backed Gull; Iceland Gull; Artic Tern(? eggs)	Unknwn	Black-headed Gull; Glaucous Gull; Herring Gull; Black-legged Kittiwake	Unknwn	Glaucous Gull; Mew Gull; Herring Gull; Great Black Backed Gull;	Unknwn		Unknwn	gull species (not specified). Terns (not specified)	Eggs poached for large gull species & for Black-legged Kittiwake	Black-legged Kittiwake; All gull species present	Unknwn		Unknwn
Stercorariidae		Unknwn		Unknwn		Unknwn		Unknwn			Great Skua	Unknwn		Unknwn
Phalacrocoracidae	Great Cormorant	Unknwn	Great Cormorant	Unknwn		Unknwn		Unknwn	Great Cormorant			Unknwn		Unknwn

	Country (Legal/Illegal harvest)													
Family	Greenland Legal harvest	Greenland Illegal harvest	Iceland Legal harvest	Iceland Illegal harvest	Norway Legal Harvest	Norway Illegal harvest	Finland Legal harvest	Finland Illegal harvest	Russia Legal harvest	Russia Illegal harvest	Faroe Islands Legal harvest	Faroe Islands illegal harvest	Canada Legal harvest	Canada illegal harvest
Sulidae		Unknwn	Northern Gannet	Unknwn		Unknwn		Unknwn			Northern Gannet			
Estimated annual adult seabird harvested legally – all seabird species (2010)[10]	153,000-285,000		Between 2002-2007: 158,000-285,000 in 2012, approx. 94,000 seabirds recorded as caught)		4,000		31,000		Common Eiders (50–62,000),		65,000-240,000		25,000 In Arctic region (260,000 for Canada)	
Estimated illegal adult seabird harvest		Unknwn		Unknwn		Unknwn		Unknwn		Illegal poaching estimated at ~100,000 annualy		Unknwn		Unknwn
Estimated annual egg harvest	6,600 (2006 data)	Unknwn	Unquantified, but assumed to be very high. include Northern Gannet, Great Cormorant, Great Skua, Great Black-backed Gull; Lesser Black-	Unknwn	Unknwn.- 'some'.	Unknwn	No legal harvesting allowed	Unknwn	Unknwn	~10,000 (illegal in West Russia), ~100,000 (mainly illegal in East Russia)	1,000-12,000	Unknwn	Unknwn	Unknwn

[10] See Merkel (2010) Arctic Biodiversity Trends 2010, Seabird Harvest, Indicator 19.

			backed Gull, Black-headed Gull, Herring Gull, Glaucous Gull, Black-legged Kittiwake, Atlantic Puffin, Common Murre, Thick Billed Murre, Razorbill, Black Guillemot, Arctic Tern											

In Greenland, hunting and egg harvesting require a valid licence. There is a hunting quota applied for King Eider, Common Eider, Thick-billed Murre and Common Guillemot. The quota during autumn and winter for professional hunters is a total of 30 birds per day, whilst for recreational licence holders it is 5 birds per day (Greenland Department of Fisheries, Hunting and Agriculture, 2015). The other seabird species do not have quota restrictions. Legal hunting seasons differ by region and by species, with hunting permitted in autumn and winter (September-March) and in spring (March-June).[11] Egg collection is permitted for Little Auks, Glaucous Gull and the Great Black-backed Gull (Merkel & Barry, 2008).

In Iceland hunting of seabirds is legal with a valid licence. Estimates of harvest rates have varied substantially in the last 10-15 years. Between 1995 and 2002 it was estimated that approximately 350,000 seabirds were killed each year (in Merkel and Barry, 2008), although this was updated to 158,000-285,000 based on data from 2002 to 2008, and the last available catch data from 2012 suggests this may have now reduced to ~94,000. Table 6 ** indicates catch records by species.

Table 6 Icelandic annual harvest of seabird species, comparison between 2012 and historic data.

Species caught	**2012 official catch record[12]**	**Average no. caught 1995-2002[13]**
Razorbill	8,487	22,936
Atlantic Puffin	38,284	163,585
Common Murre	15,075	5,9968
Thick-billed Murre	5,256	17,513
Black Guillemot	1839	4,116
Greater Scaup	214	(no data)
Long-tailed Duck	627	(no data)
Red-breasted Merganser	335	(no data)
Black-legged Kittiwake	335	1661
European Herring Gull	2457	5887
Lesser Black-backed Gull	11,914	24207
Great Black-backed Gull	7536	26402
Glaucous Gull	1063	3847
Black-headed Gull	776	2090
Northern Gannet	25	748

In Iceland, egg harvesting is legally permitted for Northern Gannet, Great Cormorant, Great Skua, Great Black-backed Gull, Lesser Black-backed Gull, Black-headed Gull, Herring Gull, Glaucous Gull, Black-legged Kittiwake, Atlantic Puffin, Common Murre, Thick Billed Murre, Razorbill, Black Guillemot, and Arctic Tern. Restrictions on timing of egg collection exist for Arctic Tern, Herring Gull, Glaucous Gull and Black Headed Gull. Records are not kept of the number of eggs harvested, although this has been highlighted as an important knowledge gap by the Conservation of Arctic Flora and Fauna (CAFF).

In Norway, legal hunting of seabirds takes place in northern Norway and in Svalbard. The largest numbers caught are the gull species (~4000), with small numbers of Black Guillemot caught each year (~ 150). Land owners are allowed to collect eggs from gull species until mid-June, and in the beginning of June for Common Eider eggs. Harvesting levels have remained stable over the last two decades (Merkel, 2010).

[11] See 2009 Decree on Seabird Hunting Regulations, http://lovgivning.gl/Lov.aspx?rid={36C03635-DFB5-411F-A8E0-1963C0BDB363}

[12] http://www.ust.is/default.aspx?pageid=277f4486-2141-11e4-a9f7-00505695691b

[13] From Merkel & Barry 2008 (Icelandic report to CBird)

In Russia indigenous hunting is legally permitted for Great Cormorants, divers, auks, gulls, skuas and terns. Rules differ according to region, based on status of populations (i.e. regional 'red listing' removes the species from the list of legally harvestable species). In the Eastern Russian Arctic, there is an open season for legal hunting of Common and King Eiders. Illegal seabird harvesting is known to occur, and is estimated to be significant- although accurate data is lacking, particularly for the western Arctic region.

The legal seabird harvest in the Arctic region of Canada mainly targets Common Eider and the Common and Thick Billed Murre. Native communities are legally permitted to harvest all seabird species in all coastal regions of Canada. Within the Baffin Bay region of Arctic Canada, 11,000-15,000 seabirds are estimated to be legally caught annually, and within the Canadian Arctic region as a whole 25,000 birds are estimated to be killed, of which approximately 12,000 are Common Eider. Smaller numbers of Common and Thick-billed Murres and Black Guillemot are caught ~2000 each year. Egg collection is also believed to be low, although little data exists on annual harvest rates. Although outside the geographic scope of the report, it is estimated that ~200,000 Murres and Common Eider are shot in the regions of Labrador and Newfoundland, in a harvest mainly undertaken by non-indigenous Canadians. There is also illegal hunting by non-indigenous Canadians of gulls, Black-legged Kittiwake and tern species.

There is very little information available on seabird harvests in the Faroe Islands, and official estimates of numbers are lacking. Merkel and Barry (2008) have estimated the numbers of birds caught and eggs harvested for a number of species. There is an open hunting season for Common Murre, Razorbill and Atlantic Puffin from October to January, while the other seabird species can be hunted year round. In addition to the hunting season, land owners hold rights to catch birds, called 'fowling rights' and which involves traditional techniques for catching birds (Norrevang, 1986). It is estimated that between 10,000-100,000 Puffins are caught each year with the majority caught by those with fowling rights. In addition, eggs are harvested and juveniles caught. Between 1000-10,000 Razorbills and Common Murres respectively are estimated to be caught each year, and up to 1000 Common Murre eggs harvested. It is estimated that between 100-1,000 Black-legged Kittiwake adults are caught. Northern Gannet fledglings are targeted, with an estimated 300-600 individuals. Gull species are also caught, with an estimate of up to 500 adults caught, and up to 500 eggs harvested across the year.

- *Bycatch*

Bycatch of seabirds is poorly known across the Arctic and sub-Arctic region for all fishing gears. Longline fisheries operate within both the Arctic and sub-Arctic region. There are some estimates of seabird bycatch in longlines for Norway and Iceland. Figure 5 from Brothers *et al*. (1999) and Dunn and Steel, (2001) identify the main longline fishing areas between Norway and Iceland. Data exists for Norwegian longline fisheries targeting haddock and tusk fish, which was systematically collected by an observer programme between 1996-1999. Analysis of this data produced an estimated catch of 6,514 seabirds per year, with a potential range between 1,177–101,380 seabirds per year (in Anderson *et al*. 2011).

In Iceland, the Cod, Hake and Tusk longline fishery in both the surrounding high seas and Exclusive Economic Zone is estimated to catch >7400 birds per year, with an upper range of 20,000 birds per year. Information presented in Dunn & Steel (2001) suggest that Great Skuas may be susceptible to longline bycatch in this region, although other (non-AEWA listed) seabird species such as Fulmars are most susceptible and caught in the highest numbers. Up to date information on seabird bycatch in the longline fisheries within the region is urgently required to assess the current situation.

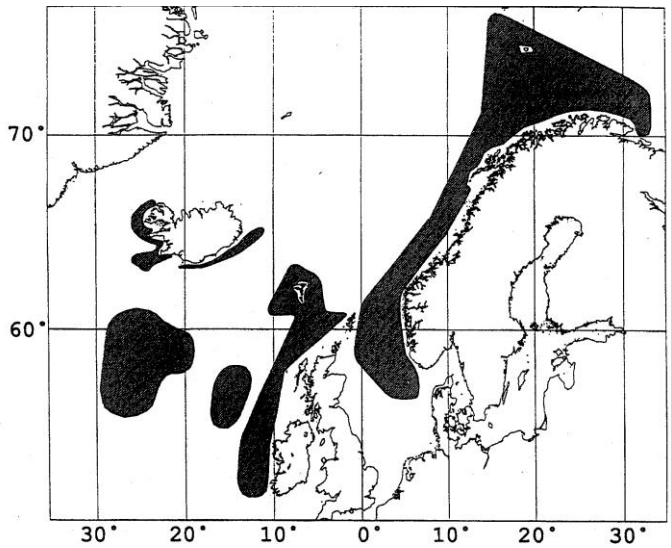

Figure 5 The main fishing grounds used by longline vessels in the north-east Atlantic (from Brothers *et al*. 1999 & in Dunn & Steel, 2001).

Gillnet fishing is known to occur throughout the Arctic and sub-Arctic region, particularly in the more coastal regions where small scale fisheries also operate. Gillnet fishers are mainly targeting Atlantic Cod, Atlantic Salmon and lumpsucker across the region. Globally, the most susceptible groups of seabirds to gillnet bycatch include cormorants, auks, diving ducks, loons and grebes (Zydelis *et al*. 2013) as they are all dive-foragers. These groups are particularly well represented within the Arctic and sub-Arctic regions, and so it can be assumed that vulnerability to gillnet bycatch is high.

In Greenland, the lumpsucker and Cod fisheries and Ringed Seal harvest are required to report seabird bycatch of Common Murres, Thick-billed Murres, King Eiders and Common Eiders as part of annual declarations of species harvested (e.g. hunted and bycaught). Additional species which were recorded as bycatch in these fisheries include Little Auk, Black Guillemot, Common Loon, Black-legged Kittiwake, Great Cormorant. The most commonly caught species is the Common Eider, although King Eiders are also caught to a lesser degree. The highest number of Common and King Eider bycatch events occurred during March-May, overlapping with the lumpsucker and Cod fisheries.

The bycatch of the two murre species peaked during winter, from November to January. The majority of bycatch records are from Southwest Greenland, between Sisimiut to Nanortalik. Common and King Eiders were also recorded as bycatch in the Central western region of Upernavik. Between 2003-2008 the average annual bycatch of Common Eider and King Eider (combined) was 3,260 (±725) and 769 Murres (±264)

In northern Norway, Fangel *et al*. (2011) estimated that at least 7,000-8,000 birds are caught annually by gillnets, including large numbers of Black Guillemot. In addition, large episodic bycatch events also occurred, with 200 Common Murres caught at one time (Fangel *et al*. 2011). In Iceland, very little is known about current bycatch levels in the gillnet fisheries (which target lumpsucker and Atlantic and Arctic Cod). Petersen (2002) estimated that between 100,000-200,000 seabirds are killed by gillnets annually (e.g. in the Lumpsucker fishery). This estimate is made up mostly of Common Murres, but also includes significant numbers of Black Guillemot and Common Eiders (in Zydelis *et al*. 2013).

Very little is known also about gillnet bycatch (or gillnet fishing effort) in the Faroe Islands, although the fishery is small-scale (Zydelis *et al*. 2013). Within the Russian region covered by AEWA still less is known about gillnet effort and bycatch although there is some information of bycatch in gillnets for the North East Pacific region (outside of the geographic scope of this review).

- *Oil Spills:*

Many of the AEWA listed seabirds which occur in the Arctic and sub-Arctic are particularly vulnerable to oil spill events, such as the auks, diving ducks, loons, grebes and Great Cormorant, due to the extensive time spent on or under the ocean surface to feed.

The Barents Sea and Norwegian Sea have had the most shipping accidents between 1994-2004 with a combined total of 86 events, and 112 tonnes of oil are known to have spilt in the Barents Sea (Humphries & Huettmann, 2014). Parts of the region have previously been inaccessible to ships and oil and gas exploration and therefore were less susceptible to oil spills. However the reduction of summer sea ice and expansion of oil and gas exploration and drilling across the high Arctic has the potential to greatly increase shipping traffic and therefore the potential for oil spill events (Fort *et al*. 2013; Clausen *et al*. 2012; National Research Council, 2014). Current areas of oil exploration and the main shipping routes are indicated in Figure 6. Expansion of oil exploration and shipping routes is expected, as summer sea ice retreats leaving areas in the high Arctic ice free.

Dealing with a future oil spill in the Arctic environment presents numerous challenges, due to the remote and isolated nature of the region, the extreme weather and lack of existing communication platforms and infrastructure to assist in a response. In Greenland, the Oil Spill Sensitivity Atlas (Clausen *et al*. 2012) ranks alcids as most vulnerable, followed by seaducks (see Table 7 below). The Exxon Valdez oil spill, which occurred in Prince William Sound in Alaska (North Pacific, USA) in 1989 spilled 40 million litres of crude oil. The spill caused the death of 250,000 seabirds, with diving birds such as murres, seaducks, cormorants, loons and grebes the most affected (Piatt *et al*. 1990 in Lance *et al*. 2001). Long term monitoring of seabird populations indicated that recovery for certain species (e.g. Mergansers, Black-legged Kittiwake) had not occurred, with populations continuing to decline nine years after the spill, while other species (e.g. grebes, murres, terns, gulls, cormorants) did not show either recovery or decline over the same period. Tracking of the Little Auk to their non-breeding feeding grounds indicated that hot spot areas, such as offshore Newfoundland overlap with areas of increased oil exploration and shipping. This suggests an increase in exposure to oil spill events or chronic oil pollution (Fort *et al*. 2013).

Table 7 Seabird species oil spill sensitivity in Greenland adapted from Clausen *et al*. (2012)

Species group	Habitat	Vulnerability	Mortality Potential	Sub-lethal potential	Recovery Period	Relative sensitivity
Alcidae	Coast & offshore	Very high	Very high	Very high	Very long	25
Gavidae	Offshore	High	High/Long	High/Long	Moderate	19
Phalacrocoracidae	Coast & offshore	High	High	High	Moderate	19
Laridae (Gull spp)	Coastal	Moderate	High	Very high	Short	17
Laridae offshore surface feeders (Black-legged Kittiwake; Arctic Tern)	Offshore	High	High	High	Short	18
Anatidae	Coast & offshore	Very High	High	Very high	Long	23

- *Contaminants/organic pollutants*

Accumulation of organic pollutants within the Arctic marine environment is well documented (Mallory *et al*. 2006), as ocean currents transport chemicals and plastics from other regions of the world, and are assimilated by lower tropic levels of the food chain. Bioaccumulation of pollutants in Arctic seabirds is also well documented, particularly for scavenging and predatory seabird species in the Arctic, such as the Glaucous Gull, and Herring Gull. Recent research on Northern Fulmar in Svalbard found nearly 90% of birds had pieces of plastic in their stomachs, documenting that even areas close to the North Pole have high plastic loads that are entering the ecosystem (Trevail *et al*. 2015). The Norwegian Sea is considered a sink for man-made chemicals and is one of the most polluted regions in the Arctic (Verreault *et al*. 2010).

The Svalbard population of Glaucous Gull has been in long term decline, and this is possibly attributable to the impacts of high loads of multiple contaminants- however the link between contaminants and survival are yet to be proven conclusively (Verreault *et al*. 2010). Research on dead and dying Glaucous Gulls in the Barents Sea indicated a negative correlation between contaminant loads and body condition, leading Sagerup *et al*. (2009) to conclude that contaminant levels contributed to the birds' death.

Further research is required to understand the level of contaminants present in all Arctic seabirds, sub-lethal and lethal impacts and the long term consequences of exposure on local populations.

- *Introduced predators & predation by native species*

Predation on seabird eggs and chicks by introduced species such as the Black Rat and American Mink is predominantly a threat in sub-Arctic regions (e.g. Norway, Finland, Iceland, northern UK) (Bonesi *et al*. 2007), as these invasive predators are limited to ice-free areas. Norway is assumed to be fully colonised by Mink, with only a few islands 'mink free'. The impacts on seabirds from the introduction of Mink has not been studied there however (Bonesi *et al*. 2007). In Iceland, Mink has led to significant and ongoing impacts at breeding colonies for a number of ground-dwelling seabird species (Bonesi *et al*. 2007). Under warmer climate change it is possible that some introduced predators will be able to extend their range northwards, although in the high Arctic the likely reduction of summer sea ice could isolate many seabirds on predator free islands.

High levels of predation occur in both the Arctic and sub-Arctic caused by native predators of many of the seabird species (e.g. Auks, Black-legged Kittiwake, Common Eider). Predators and scavengers

include the two Skua species, the Glaucous Gull and the Lesser and Greater Black Backed Gulls, as well as mammalian predators (e.g. Arctic Fox, Polar Bear). Predation on adults and eggs is considered one of the most important causes of mortality and reproductive failure (Hanssen *et al*. 2013). Arctic tundra breeding species, such as the Common Eider frequently breed on islands to avoid predation by Arctic Fox (Divoky & Suydam 1995). The species could potentially benefit from reduced predation pressure under future climatic change, as ice-free areas during summer would prevent Arctic Foxes from accessing islands (Hanssen *et al*. 2013)

As discussed above, changes in ecosystem dynamics, such as the disruption of the lemming cycle can lead to increased predation on seabird species.

- *Human disturbance (shipping, light pollution, tourism)*

As described above, human activities within the Arctic and sub-Arctic regions are intensifying. The following figure, adapted from Humphries & Huettmann (2014) demonstrates the areas of intensive human use around the Arctic, including oil exploration, tourism, mineral extraction and fisheries.

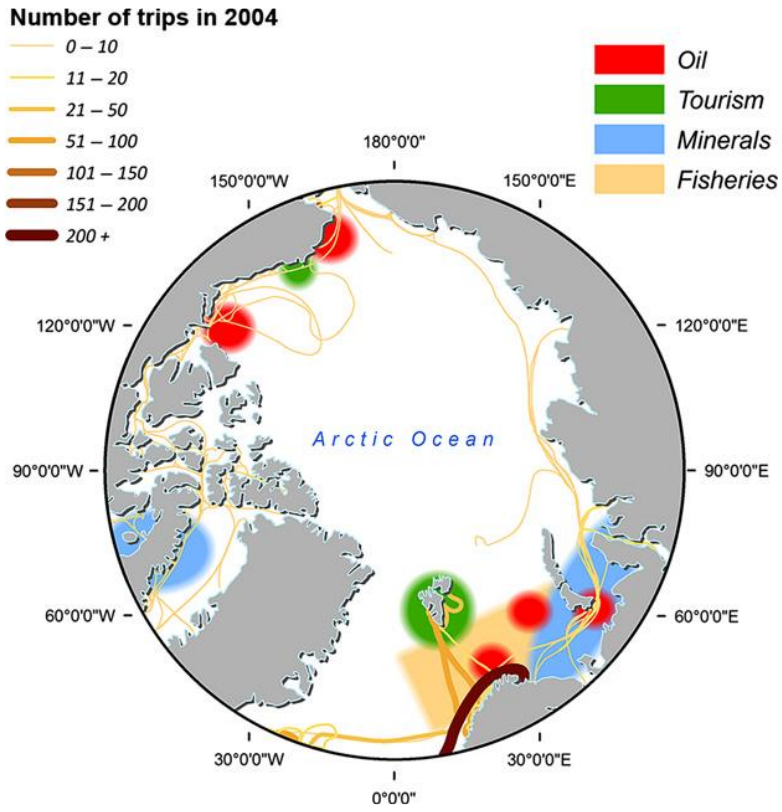

Figure 6, Areas of existing human activity in the ice-free regions of the Arctic as per the Arctic Marine Shipping Assessment. Adapted from Humphries & Huettmann, (2014)

Increased shipping traffic, new shipping routes through the Arctic Ocean and new areas of oil exploration increase the likelihood of oil pollution, including chronic and spill events. Shipping traffic and oil platforms also pose the risk of light pollution, attracting seabirds at night and causing collision and disturbance. The most susceptible species include the Little Auk, which are attracted to oil platforms and ships and have high mortality from collision (Wiese *et al*. 2001).

Disturbance from tourism is becoming increasingly important particularly in the more accessible regions of the Arctic such as Svalbard and in population destinations such as Iceland. Seabird species breeding on both the ground (e.g. Atlantic Puffin, Little Auk) and on cliffs are sensitive to disturbance at breeding colonies. Cliff breeding murres may leave their eggs or chicks if disturbed, which exposes them to predation.

Conservation action underway:

- ***Marine Important Bird Areas Identified within the Arctic & sub-Arctic region***:

Marine Important Bird Areas for each of the seabird species listed under the AEWA Agreement are shown in Appendix II. Major gaps exist throughout the Arctic and sub-Arctic region for all of the seabird species, particularly for coastal extension areas around colonies and pelagic sites auks, and other pelagic species such as Black-legged Kittiwake and for coastal sites around Greenland, Canada and Russia. The main gaps for auk species include a lack of both coastal and pelagic sites for Common Murre, Atlantic Puffin, Thick-billed Murre and Razorbill. For the seaducks, large areas of coastal Russian Arctic do not currently have marine IBAs identified for seabirds (e.g. Common Scoter, Goosander, Red-breasted Merganser, Velvet Scoter, Steller's and King's Eider).

No marine IBAs have been identified in the sub-Arctic covering the wintering areas for the King and Steller's Eider (e.g. Norway, Finland, Russia). For the loons, very few marine IBAs have been identified in either wintering or breeding grounds in the region, particularly lacking for the Yellow-billed Loon and Arctic Loon in Norway and Finland, and for the Common Loon in Greenland and in the wintering grounds. The Red-throated Loon lacks marine IBAs across most of its Arctic range, with major gaps in Russia, Greenland and Canada. The gull species in the region also lack marine IBAs, with major gaps for Iceland Gull, Lesser Black-backed Gull, European Herring Gull, Great Black-backed Gull, Black-headed Gull. The Arctic Tern and Sabine's Gull have sites identified in the North East Atlantic, but are lacking sites in Greenland and Canada. The marine IBA network in the region also needs to be extended for the Red Phalarope and Red-necked Phalarope to include the Arctic breeding areas in western Greenland and Canada.

Table 8a, seabird species covered by existing marine IBA network

Greenland (15 seabird species), in 50 marine IBAs	Little Auk, Thick-billed Murre, Razorbill, Black Guillemot, Atlantic Puffin, Common Eider, King Eider, Long-tailed Duck, Red-breasted Merganser, Red-throated Loon, Red Phalarope, Arctic Tern, Iceland Gull, Long-tailed Skua, Great Cormorant
Iceland (21 seabird species) in 48 marine IBAs	Razorbill, Atlantic Puffin, Black Guillemot, Common Murre, Thick-billed Murre, Greater Scaup, Common Diver, Red-throated Loon, Great Skua, Black-legged Kittiwake, Lesser Black-backed Gull, Great Black-backed Gull, Herring Gull, Glaucous Gull, Arctic Tern, Goosander, Great Cormorant, Common Eider, Horned Grebe, Northern Gannet)
Svalbard, Jan Mayan /N.Norway (11 seabird species). 11 marine IBAs in Svalbard, Jan Mayan.	Common Eider, Black Guillemot, King Eider, Glaucous Gull, Long-tailed Duck, Red Phalarope, Black-legged Kittiwake, Thick-billed Murre, Little Auk
Northern Norway (mainland) (12 seabird species) 18 marine IBAs in Northern Norway	Common Eider, King Eider, Velvet Scoter, Long-tailed Duck, Common Scoter, Goosander, Red-breasted Merganser, Red throated Loon, Horned Grebe, Atlantic Puffin, Razorbill, Common Guillemot, Black Guillemot.
Faroe Islands (four seabird species) in 18 marine IBAs	Great Skua, Common Murre, Black Guillemot, Atlantic Puffin
Finland	
Canada (five seabird species) in five marine IBAs	Little Auk, Thick-billed Murre, Black Guillemot, Red Phalarope, Sabine's Gull
Russia (13 seabird species) in 11 marine IBAs	Common Eider, Steller's Eider, King Eider, Common Goldeneye, Long-tailed Duck, Greater Scaup, Arctic Loon, Razorbill, Atlantic Puffin, Thick-billed Murre, Black Guillemot, Great Skua, Arctic Tern,

- ***Marine Protected Areas***

Within the region there are Protected Areas in the terrestrial and coastal zone and Marine Protected Areas (MPAs) both within the Arctic Countries' Exclusive Economic Zones and offshore within the High Seas. Appendix III indicates the overlap between existing marine Important Bird Areas and the current Protected Area network (including the Convention on Wetlands- RAMSAR-, National Parks etc) in the region, where habitats and species are provided some form of protection.

The Convention on Biological Diversity's programme to identify Ecologically and Biologically Significant Areas (EBSAs) within the Arctic and sub-Arctic region has identified 77 EBSAs. The geographic scope for site identification did not include the Exclusive Economic Zones for Arctic countries, except for Russia. Many of the sites which were identified included breeding and foraging areas for seabirds. The most critical areas were also merged within 13 large 'Super EBSAs'.[14] The

[14] See additional information on EBSAs in the Arctic Report, available here: https://www.cbd.int/doc/?meeting=EBSAWS-2014-01

figure in Appendix VIII identifies the 77 EBSAs which were accepted by the Convention on Biological Diversity.

- ***International Species/ Seabird Action Plans & conservation strategies***:
  - Nordic Action plan for seabirds in Western-Nordic areas (Norden, 2010)[15]
  - Conservation of Arctic Flora and Fauna- International Murre Conservation Strategy and Action Plan [16] Circumpolar Eider Conservation Strategy and Action Plan[17].
  - AEWA International Species Action Plan, Long-tailed Duck (Hearn *et al*. 2015)
  - BirdLife International LIFE EURO-SAP for Velvet Scoter[18]

- ***Seabird Monitoring Programmes***
  - CAFF Circumpolar Murre Tagging project
  - SEAPOP monitoring in Norway (Spitsbergen, Bjørnøya, Hornøya, Hjelmsøya, Anda and Røst)

- ***Climate change mitigation***

The Conservation of Arctic Flora and Fauna (CAFF)[19], the biodiversity working group of the Arctic Council[20], has a Circumpolar Biodiversity Monitoring Programme which coordinates monitoring programmes across marine[21], coastal[22], terrestrial[23] and freshwater[24] environments of the Arctic and sub-Arctic region, through their expert groups. The monitoring programmes include monitoring of climate change impacts in each of the ecosystems.

CAFF's current 'Actions for Arctic Biodiversity 2013-2021'[25] include the following priorities:

- Adaptation to climate change (Recommendation 2); Incorporate resilience and adaptation of biodiversity to climate change into plans for development in the Arctic.
- Safeguarding critical areas (Recommendations 5, 6, and 7). Develop and implement mechanisms that best safeguard Arctic biodiversity under changing environmental conditions, such as loss of sea ice, glaciers and permafrost
- Safeguarding biodiversity under changing conditions (Recommendation 7);

The Arctic Monitoring and Assessment Programme[26], another working group of the Arctic Council, is responsible for monitoring and assessing the status of the Arctic region with respect to climate change issues**;** documenting levels and trends, pathways and processes, and effects on ecosystems, and proposing actions to reduce associated threats for consideration by governments; and producing sound science-based, policy-relevant assessments and public outreach products to inform policy and decision-making processes.

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[15] http://norden.diva-portal.org/smash/record.jsf;jsessionid=N4_EWYxLq9NyAglqVIAVuAlyAG6NEU0l9oPITfFj.diva2-search3-vm?pid=diva2%3A701212&dswid=-13

[16] http://www.caff.is/murre-conservation-strategy-and-action-plan

[17] http://www.caff.is/eider-conservation-strategy-and-action-plan

[18] Project underway, beginning 2015, www.birdlife.org

[19] Conservation of Arctic Flora and Fauna (CAFF) http://www.caff.is/

[20] The Arctic Council, an Intergovernmental forum for Arctic government cooperation is formed by representatives from Canada, Denmark/Greenland/Faroe Islands, Finland, Iceland, Norway, Russian Federation, Sweden, and United States. It has six working groups http://www.arctic-council.org/index.php/en/

[21] CAFF Marine Ecosystem Monitoring Programme & Expert Group, http://www.caff.is/marine

[22] CAFF Coastal Ecosystem Monitoring Programme & Expert Group http://www.caff.is/coastal

[23] CAFF Terrestrial Ecosystem Monitoring Programme & Expert Group http://www.caff.is/terrestrial

[24] CAFF Freshwater Ecosystem Monitoring Programme & Expert Group http://www.caff.is/freshwater

[25] Actions for Arctic Biodiversity 2013-2021 Implementing the recommendations of the Arctic Biodiversity Assessment http://www.caff.is/actions-for-arctic-biodiversity-2013-2021

[26] Arctic Monitoring and Assessment Programme & Expert Group http://www.amap.no/

- ***Seabird bycatch mitigation***

The Circumpolar Flyway 2015-2019 workplan under CAFF's Arctic Migratory Bird Initiative lists as a priority the mitigation of seabird bycatch in fisheries. The first action within this is to undertake gillnet bycatch assessments in key fisheries and countries. This will include updating existing bycatch data, the sharing of fishing effort data by Arctic Council Governments and overlapping this with seabird distribution, incorporation of seabird bycatch data into fisheries observer programmes and implementation of observer programmes in all countries. The second action is to develop and test bycatch mitigation measures

In 2012, the European Commission proposed the Seabird Plan of Action[27] to minimise seabird bycatch in the EU, setting the first stage for ensuring EU collective action to tackle seabird bycatch. In 2013, the EU adopted a Common Fisheries Policy (CFP) with one of its objectives to minimise the impact of the fisheries, and therefore legally obliging Member States to minimise fisheries impacts on seabirds. The CFP is now to be implemented through regional fisheries plans and a framework of technical conservation rules where these will be instrumental to regulate the fisheries and implement mitigation measures. Furthermore, the EU intends to revise the legislations that regulates how fisheries data should be collected and used – instrumental to ensure data on seabird bycatch is systematically collected and available, including through observers with access to all vessels.

BirdLife International, its partner in Iceland- Fuglavernd[28] and its partner in the UK, the RSPB[29] are currently undertaking a small scale study on board Icelandic gillnet vessels targeting lumpsuckers. The survey will scope the extent and severity of seabird bycatch in participating vessels. BirdLife is also involved in leading a gillnet bycatch mitigation project in the Lithuanian Baltic Sea. The Seabird Task Force[30] involves monitoring bycatch rates and developing gillnet mitigation measures to reduce bycatch. Successful mitigation measures will hopefully be implemented in other fisheries, including those in the Arctic.

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- ***Seabird harvest data collection & sustainable harvest management***

CAFF's Seabird 'CBIRD' working group coordinates the seabird monitoring programmes across the Arctic region, including the synthesis of harvest levels of seabirds (e.g. Merkel & Barry 2008, Arctic Biodiversity Trends 2010) and the publication of factsheets and reports which are available on the Arctic Biodiversity Data Service[31]. Information on harvest is not updated annually.

The Circumpolar Flyway 2015-2019 workplan under CAFF's Arctic Migratory Bird Initiative lists the Mitigation of unsustainable harvest as a key priority. The workplan will develop reporting guidelines to ensure that reporting harvest is carried out consistently throughout the circumpolar Arctic by 2016. The workplan will also develop outreach and education plans to support sustainable harvest of seabirds with an emphasis on direct local involvement from coastal communities.

[27] Communication from the Commission to the European Parliament and the Council Action Plan for reducing incidental catches of seabirds in fishing gears http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437554212028&uri=CELEX:52012DC0665
[28] Fuglavernd Iceland, www.fuglavernd.is
[29] Royal Society for the Protection of Birds, RSPB, www.rspb.org.uk
[30] Seabird Task Force, www.seabirdbycatch.com
[31] http://abds.is/index.php

- ***Oil spill mitigation***

The Arctic Council working group, Emergency Prevention, Preparedness and Response (EPPR)[32], is actively engaged in developing guidelines for international cooperation in the event of an oil spill in the Arctic region. This includes leading on the development of an environmental risk matrix, decision support tools (e.g. Arctic Emergency Resource Maps for Oil Spill Response, guide to oil spill response in snow and ice conditions in the Arctic.

Under CAFF's Actions for Arctic Biodiversity 2013-2021, there is an action to implement the agreement on cooperation on marine oil pollution preparedness and response in the Arctic, including executing international exercises and maintaining and updating operational guidelines.[33]

The Arctic Council's working group PAME, has produced non-binding guidelines on Arctic offshore oil and gas exploration and production. This includes Arctic Council Offshore Oil and Gas Guidelines report (2009)[34]

The Nordic Council of Ministers funded the North Atlantic Sensitivity and Response Map[35], as a joint program by Greenland, Iceland, Faroe Islands and Norway. This is a decision support tool with information on important areas for biodiversity (e.g. seabird colony locations).

- ***Relevant Multi-lateral Environmental Agreements (MEAs)***

Table 8 provides a summary of the existing MEAs that exist in the region and relate to mitigation of key threats to seabirds and Arctic biodiversity.

[32] EPPR, http://www.arctic-council.org/eppr/current-activities-projects/
[33] CAFF Actions for Arctic Biodiversity, see http://www.caff.is/actions-for-arctic-biodiversity-2013-2021
[34] PAME, http://www.pame.is/index.php/projects/offshore-oil-and-gas

[35] Nordic Council, North Atlantic Sensitivity and Response Map, 2010 http://www.nasarm.is/

Table 8b, Main international &regional frameworks & organisations in Arctic and sub-Arctic focused on relevant threats to AEWA listed seabirds and conservation actions

Existing MEAs/Conventions /Organisations	Countries (Contracting Parties, Member States, Partners)	Climate change	Harvesting	Bycatch /Fisheries Management	Oil spill	Contaminants & litter	Introduced predators	Human disturbance (Resource extraction & energy production)	Human disturbance (Tourism)	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
CAFF[36], Actions for Biodiversity, AMBI, CBIRD	Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, USA	✓	✓	✓			✓	✓	✓	✓	✓
PAME[37]	Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, USA	✓			✓	✓		✓	✓		
EPPR[38]	Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, USA				✓	✓					
ACAP[39]	Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, USA					✓					
Nordic Council of Ministers[40]	Denmark, Sweden, Norway, Finland, Iceland, Faroe Islands, Greenland,	✓	✓	✓	✓	✓	✓	✓	✓		
OSPAR[41]	Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland & UK	✓			✓	✓		✓		✓	✓
RAMSAR[42]	All countries in region									✓	

CBD- EBSA[43]	All countries in region									✓	
CMS[44]	All countries except Russia, Iceland , Canada, USA		✓	✓				✓			
NEAFC[45]	Denmark (Greenland, Faroe Islands), Iceland, Norway, European Union, Russia			✓							
NAFO[45]	Canada,Denmark (Faroe Islands & Greenland), European Union,Iceland, Norway, Russia Ukraine,USA, Cuba, France (Saint Pierre and Miquelon), Japan, South Korea										
ICES [46]				✓							
Marpol Convention[47]	All countries in region				✓			✓			
European Commission Marine & Environment Directives, Policies[48]	Finland, Sweden, UK, Denmark			✓						✓	✓
BirdLife International & partners [49]	Iceland, Norway, Finland, Faroe Islands			✓						✓	✓

Explanation of MEA/Convention/Organisation names and roles

[36] The Arctic Council is the main circumpolar framework for Arctic conservation, including for climate change mitigation and adaptation. There are six working groups, of which three are particularly relevant to seabird conservation. The first is Conservation of Arctic Flora and Fauna **(CAFF)** http://www.caff.is/ including the Actions for Arctic Biodiversity http://www.caff.is/actions-for-arctic-biodiversity-2013-2021 , the Arctic Migratory Birds Initiative (AMBI) http://www.caff.is/arctic-migratory-birds-initiative-ambi and its Circumpolar Flyway Workplan and CAFF's seabird expert group- CBIRD and individual strategies for species groups

[37] The Arctic Council working group for the Protection of the Arctic Marine Environment **(PAME)**, http://www.pame.is/ works to address policy and non-emergency pollution prevention and control measures related to the protection of the Arctic marine environment from both land and sea-based activities. This includes policies relating to shipping, pollution and tourism.

[38] The Arctic Council working group for the Emergency Prevention, Preparedness and Response Working Group **(EPPR)** http://www.arctic-council.org/eppr/ aims to contribute to the protection of the Arctic environment from the threat or impact that may result from an accidental release of pollutants or radionuclides.

[39] The Arctic Council Arctic Contaminants Action Programme **(ACAP)** http://www.arctic-council.org/index.php/en/acap-home/283-about-acap works to contribute to the protection of the Arctic environment from the threat or impact that may result from an accidental release of pollutants or radionuclides

[40] The Nordic Council of Ministers is the official inter-governmental body for co-operation in the Nordic Region. The council has prepared an Action plan for seabirds in Western-Nordic areas. It prioritises seabird conservation action for the region http://norden.diva-portal.org/smash/record.jsf;jsessionid=9zef5MwA1u_AI1NncruJ8oRHzIGpXy-KBqxb06M_.diva2-search3-vm?pid=diva2%3A701212&dswid=-6450

[41] The Convention for the Protection of the marine Environment of the North-East Atlantic **(OSPAR),** http://www.ospar.org works to protect the marine environment through six main strategies- Biodiversity and Ecosystem Strategy, the Eutrophication Strategy, the Hazardous Substances Strategy, the Offshore Industry Strategy and the Radioactive Substances Strategy, together with a Strategy for the Joint Assessment and Monitoring Programme

[42] The Convention on Wetlands of International Importance **(RAMSAR)** http://www.ramsar.org works towards the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

[43] The Convention on Biological Diversity **(CBD)** aims to protect biological diversity through high level policy, including targets for marine protected areas. The CBD has developed and adopted a number of sites in the Arctic as Ecologically and Biologically Significant Areas **(EBSAs)** https://www.cbd.int/ebsa/ and https://www.cbd.int/doc/?meeting=EBSAWS-2014-01

[44] The Convention on Migratory Species **(CMS)** http://www.cms.int/en/documents/strategic-plan/welcome under the aegis of the United Nations Environment Programme, provides a global platform for the conservation and sustainable use of migratory animals and their habitats.

[45] Regional Fisheries Management Organisation (RFMO). There are two RFMOs of relevance to the region. This includes the North East Atlantic Fisheries Commission (**NEAFC**), http://www.neafc.org/, The NEAFC manages fisheries in the high seas areas of the North East Atlantic, There is currently no programme or work package dedicated to minimising seabird bycatch, or in implementing the Food and

Agriculture Organisation's (FAO) international plan for minimising seabird bycatch. This is considered the remit for the individual contracting parties.
The North West Atlantic Fisheries Organisation **(NAFO)** http://www.nafo.int/ manages fisheries in the high seas of the West Atlantic. According to NAFO's submission to the Convention on Migratory Species follow up on bycatch, NAFO does not have a direct policy on bycatch.
http://www.cms.int/sites/default/files/document/ScC16_Inf_11_8_Response_from_NAFO_Eonly_0.pdf

[46] International Council for the Exploration of the Sea **(ICES)** http://www.ices.dk/Pages/default.aspx provides governments and regional bodies with scientific advice on fish stocks, catch limits and bycatch.

[47] The International Convention for the Prevention of Pollution from Ships **(Marpol Convention)**, under the International Maritime Organisation http://www.imo.org/en/Pages/Default.aspx

[48] The European Union's Marine and Environment Directives and policies include:
The Natura 2000 network of protected sites, http://ec.europa.eu/environment/nature/natura2000/index_en.htm,
The Marine Strategy Framework Directive (MSFD) http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm,
The Maritime Spatial Plan Directive (MSP)
http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm,
Common Fisheries Policy (CFP) http://ec.europa.eu/fisheries/cfp/index_en.htm,
Seabird Plan of Action http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437554212028&uri=CELEX:52012DC0665

[49] BirdLife International Marine Programme, www.birdlife.org, involves a focus on seabird bycatch reduction through collaboration with fishermen such as on the Seabird Task Force www.seabirdbycatch.com, and on marine Important Bird and Biodiversity Area identification, see http://maps.birdlife.org/marineIBAs/default.html.

BirdLife Partners actively involved in marine and seabird conservation: BirdLife Iceland- Fuglavernd http://fuglavernd.is/, BirdLife Norway http://www.birdlife.no/organisasjonen/english.php , Faroese Ornithological Society http://www.birdlife.org/europe-and-central-asia/partners/faroese-ornithological-society, BirdLife Finland http://birdlife.fi/english/index.shtml

Knowledge gaps & Research needs

- Winter foraging grounds and winter dispersal of Arctic & sub-Arctic breeding seabirds.
- Country and species specific records on legal annual harvest for seabirds across Arctic and sub-Arctic region, including egg collection
- Country and species specific records on illegal harvest for seabirds, including egg collection
- Numbers of birds caught by gillnets and longlines each year
- Gillnet fishing effort and location of important fishing areas
- Cumulative impact at flyway/regional scale on populations from legal harvest, illegal harvest and fisheries bycatch
- Scale and impact of invasive predators on seabird populations across region, and implications for change under increasingly ice-free region.
- Scale and impact of contaminants, including marine litter on seabird species (other than Fulmar)
- Multi-colony tracking to identify key winter foraging grounds & migratory routes for all Arctic and sub-Arctic breeding species.
- Detailed information on species and population level effects of climate change, particularly in relation to prey reduction.
- Gillnet bycatch- quantification of effort and numbers of seabirds killed (seasonality, fisheries)
- Longline bycatch- quantification of effort and bycatch rate

Recommendations for regional action:

- Identification and designation of coastal and offshore foraging sites for seabirds (e.g. MPA designation and management) particularly in Greenland, Canada and in high seas.
- Data collection on legal and illegal harvest and fisheries bycatch through existing regional frameworks with additional support from others (e.g. CAFF)
- Bycatch mitigation developed and implemented in gillnet fisheries
- Detailed collection of multi-species catch data & egg harvesting
- Creation of a shared Arctic/sub-Arctic database on annual seabird catch, and other significant causes of mortality (e.g. bycatch).
- Assessment at regional/flyway scale to determine sustainable catch limits for seabird species.
- Restrict egg collection to an early stage during breeding season
- Carry out specific research on climate change impacts for seaducks, loons, grebes etc.
- Monitor seabird bycatch on longline and gillnet vessels and test bycatch mitigation solutions on gillnet fisheries (e.g. lumpsucker and cod gillnet fisheries)
- Cooperate on developing a regional Arctic/sub-Arctic oil spill action plan for quick and coherent response by all countries in the region.

Seabird conservation status, threats and conservation action in the Temperate Northern Atlantic

Given the large amounts of information available for seabirds across the European region, the biogeographic regions are reviewed for threats and conservation action at the finer, eco-region scale. These eco-regions are identified as follows: Northern European Seas (North Sea, Baltic Sea, Celtic Sea), Lusitanian (North Atlantic Shelf, Madeira/Canaries/Azores, Saharan upwelling), and Mediterranean and Black Sea. While many of the same threats operate across the biogeographic region, in some sub-regions the threats are likely to be having more of an impact on species.

Northern European Seas Eco-region

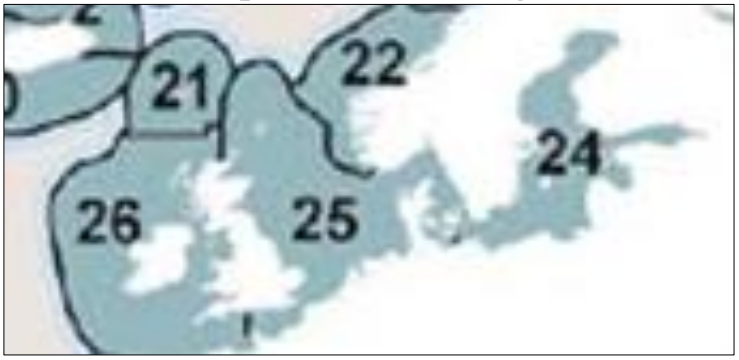

Figure 7, Northern European Seas focal area. Adapted from Spalding *et al*. (2007)

There are 48 seabird species from 10 families which are listed under AEWA and which occur in the Northern European Seas biogeographic area (North Sea, Baltic Sea, Celtic Seas). The region is important for breeding seabirds from each of the represented families, and is also important as a wintering/ non-breeding area for many species.

There are 20 species with globally declining populations, with one species (Velvet Scoter) listed as Endangered and two species (Long-tailed Duck and Steller's Eider) listed as Vulnerable on the IUCN/BirdLife Global Red List. Declines are seen at the global level in Atlantic Puffin numbers, and local declines have been found within breeding colonies in the region, such as in Southern Norway.

There are ten species of seaduck within the region, and five species have declining populations at the global level, with massive declines observed in the Baltic for over wintering species (e.g. Long-tailed Duck, Velvet Scoter, Steller's Eider). The global population of the four loon species are also all declining. Within the Laridae, 6 of the Tern species within the region are declining, and three Gull species (Black-legged Kittiwake, the European Herring Gull and Mew Gull) are also in decline.

The European Red List of Birds indicates that the populations of eight species are regionally threatened, with a further six species Near Threatened. Table 9 lists the AEWA seabird species which are occurring in the eco-region, divided into North Sea, Baltic Sea, and Celtic Sea.

Table 9 Species in region, their conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, R= Resident, Vg= vagrant, y= Present, n=not recorded as present)

Family	Species	Global Popn trend & Global Red List Status	European Red List Status & Population Trend (EU Status given where applicable & different)	Period of life-cycle in North Sea (includes all North Sea countries -& Southern Norway & Denmark)			Period of life cycle in Baltic Sea/& or inland Baltic Countries			Period of life cycle in Celtic Sea & (Ireland, UK)		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Alcidae	Atlantic Puffin	LC-↓	EN↓ (NT in EU)	y	y		-	Vg	-	y	y	y
	Common Murre	LC- ↑ (US)	NT	y	n	y	y	y	y	y	y	y
	Little Auk	LC- ↓	LC	n	y	n	n	y	n	n	y	n
	Razorbill	LC-↑	NT	y	y	y	y	y	y	y	y	y
	Black Guillemot	LC-↑ (US)	LC	y	y	y	y	y	y	y	y	y
Anatidae	Long-Tailed Duck	VU ↓	VU	n	y	n	n	y	n	n	y	n
	Common Eider	LC-Unkwn.	VU (EN in EU)	y	y	y	y	y	y	y	y	y
	Steller's Eider	VU- ↓	LC	n	y	n	n	y	n	-	-	-
	King Eider	LC- ↓	LC	n	y	n	n	y	n	-	-	-
	Common scoter	LC-Unkwn.	LC	y	y	y	y	y	y	y	y	y
	Velvet Scoter	EN-↓	VU	n	y	n	y	y	y	n	y	n
	Goosander	LC-↑	LC	y	y	y	y	y	y	y	y	y
	Red-breasted Merganser	LC-↑	NT	y	y	y	y	y	y	y	y	y
	Greater Scaup	LC-↓	VU	y	y	y	y	y	y	n	y	n
Anatidae	Common Goldeneye	LC-Stable	LC	n	y	n	y	y	y	n	y	n
Gaviidae	Yellow-billed Loon	NT- ↓	VU	n	y	n	n	y	n	-	-	-
	Arctic Loon	LC- ↓	LC	y	y	y	y	y	y	n	y	n
	Common Loon	LC-↓	VU	n	y	n	-	-	-	n	y	n
	Red-throated Loon	LC-↓	LC	y	y	n	y	y		n	y	n

Family	Species	Global Popn trend & Global Red List Status	European Red List Status & Population Trend (EU Status given where applicable & different)	Period of life-cycle in North Sea (includes all North Sea countries -& Southern Norway & Denmark)			Period of life cycle in Baltic Sea/& or inland Baltic Countries			Period of life cycle in Celtic Sea & (Ireland, UK		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Laridae	Black Tern	LC-↓	LC	y	n	n	y	n	n	y	n	n
	Common Tern	LC-↓	LC	y	y	n	y	y	n	y	n	n
	Common Gull-billed Tern	LC-↓	LC	y	n	n	n	n	n	n	n	n
	Roseate Tern	LC-Unkwn.	LC	y	n	n	-	-	-	y	n	n
	Caspian Tern	LC-↑	LC	n	n	n	y	n	n	n	n	n
	Little Tern	LC- ↓	LC	y	n	n	y	n	n	y	n	n
	Arctic Tern	LC- ↓	LC	y	n	n	y	n	n	y	n	n
	Sandwich Tern	LC-Stable	LC	y	n	n	y	n	n	y	n	n
	Arctic Tern	LC-↓	LC	y	n	n	y	n	n	y	n	n
	Little Gull	LC-↑	NT (LC in EU)	n	y	n	y	y	n	n	y	n
	Caspian Gull	LC-Stable	LC	n	y	n	n	y	n	n	n	n
	Mediterranean Gull	LC-Stable	LC	y	y	n	y	y	n	n	y	n
	Yellow-legged Gull	LC-↑	LC	y	y	y	n	y	n	n	n	n
	European Herring Gull	LC-↓	NT (VU in EU)	y	y	n	y	y	n	y	y	n
	Iceland Gull	LC-Stable	LC	n	y	n	-	-	-	n	y	n
	Black-legged Kittiwake	LC-↓	VU (EN in EU)	y	y	n	-	-	-	y	y	n
	Glaucous Gull	LC-Stable	LC	n	y	n	n	y	n	n	y	n
	Great Black-backed Gull	LC-↑	LC	y	y	y	y	y	y	y	y	y
	Lesser Black-backed Gull	LC-↑	LC	y	y		y	y		y	y	
	Black-headed Gull	LC-↓	LC	y	y		y	y		y	y	
	Mew Gull	LC-Unkwn.	LC	y	y		y	y		y	y	

Family	Species	Global Popn	European Red List	Period of life-cycle in North	Period of life cycle in	Period of life cycle in Celtic

		trend & Global Red List Status	Status & Population Trend (EU Status given where applicable & different)	Sea (includes all North Sea countries -& Southern Norway & Denmark)			Baltic Sea/& or inland Baltic Countries			Sea & (Ireland, UK		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Phalacrocoracidae	Great Cormorant	LC-↑	LC	y	y	y	y	n	n	y	y	y
Podicipedidae	Horned grebe	LC-↓	NT (VU in EU)	y	y	n	y	y	n	n	y	n
	Red-necked Grebe	LC-↓	LC	y	y	n	y	y	y	n	y	n
	Black-necked Grebe	LC-Unkwn.	LC	y	y	n	y	n	n	n	y	n
	Great Crested Grebe	LC-Unkwn.	LC	y	y	y	y	y	n	y	y	y
Scolopacidae	Red-necked Phalarope	LC-↓	LC	y	n	n	y	n	n	y	n	n
Stercorariidae	Great Skua	LC-Stable	LC	y	y		-	-	-	n	y	n
	Long-tailed Jaeger	LC-Stable	LC	y	n	n	-	-	-	-	-	-
Sulidae	Northern Gannet	LC ↑	LC	y	y	y	y	y	y	y	y	y

Key threats in Northern European Seas:

- *Prey depletion : forage fisheries & benthic communities*

Depletion of prey is a major threat for many of the seabird species within the region and includes multiple interacting factors, such as over-fishing, climate change and habitat degradation.

For piscivorous seabird species such as the Atlantic Puffin, Razorbill, Black Guillemot, Common Murre, Black-legged Kittiwake, Common, Arctic, Little, Roseate and Sandwich Terns and Skuas, there is a heavy reliance on forage fish species, during both the breeding and non-breeding seasons (Engelhard *et al*. 2013). The North Sea has been fished intensively for decades, with fisheries targeting forage fish species, such as Atlantic Herring, sandeels, sprat, Norway Pout and in a smaller scale for sardine and anchovy (Englehard *et al*. 2013). Historically, forage fisheries have been over-exploited; the North Sea Atlantic Herring fishery collapsed in the second half of the 20th Century due to over fishing, although it has since recovered (Dickey-Collas, 2010).

The North Sea sandeel fishery was the largest single species fishery in the region up until 2004, after which closures were implemented to the east of Scotland following concern over seabird declines and ICES advice (Daunt *et al*. 2008). Sandeel fisheries still operate in the Dogger Bank, along the Norwegian coast and in small scale off the Shetland Islands.

In addition to fishing pressure, ecosystem changes brought on by increasing ocean temperatures have also led to shifts in timing and distribution of forage fish species and disruption of food web linkages between plankton, forage fish, and their predators (Daunt *et al*. 2008; Fredriksen *et al*. 2004; Engelhard *et al*. 2013). The interacting factors of fishing pressure and climate change are believed to be the main causes of long term declines in forage fish availability, shifts in distribution and timing and prey quality in the North Sea, and the subsequent seabird breeding failures (Anderson *et al*. 2014; Dickey-Collas, 2013; Fredericksen *et al*. 2004; Furness, 2002; Furness *et al*. 2007; Wanless *et al*. 2005).

During the breeding season, seabirds such as the Black-legged Kittiwake are restricted to smaller foraging ranges, and so changes in local prey availability have repercussions for both chick and adult survival as birds have to forage further and longer to locate prey (Frederiksen *et al*. 2004). The timing of Sandeel availability (e.g. the 0 class Sandeel) has also been shifting in the North Sea over the last thirty years, leading to trophic mis-matches, as seabird species, including the Black-legged Kittiwake, Atlantic Puffin, Common Murre and Black Guillemot try to time breeding with peaks in food availability but fail (Burthe *et al*. 2012).

Not only does the lack of forage fish limit reproductive success, but local climatic conditions and prey availability in the North Sea in autumn and winter have also been linked to the adult survival of seabird species, including the Atlantic Puffin, Black Legged Kittiwake and Great Skua (Harris *et al*. 2005). Seabirds in poor condition from lack of sufficient food are less likely to survive winter than those that have fed well (Harris *et al*. 2005). Lack of food due to extreme weather events and oceanic storms has also been linked to mass mortality and wrecks of seabirds during winter. In winter 2013/2014, thousands of auk species, including Atlantic Puffins were found washed up along the Atlantic coastlines of Ireland, UK, France, Spain and Portugal, following intense winter storms.

In relation to wintering seaducks and other benthic feeding seabirds (loons, grebes etc), their bivalve prey has been negatively affected by various factors, including sea temperature rise, intensive fishing pressure for aquaculture harvesting (Skov *et al*. 2011; Camphuysen *et al*. 2001), invasive predation such as from the Round Goby in the Baltic Sea (Hearn *et al*. 2015), and from habitat destruction by aggregate extraction processes (Bellebaum *et al*. 2011).

Reductions in bivalve prey have been implicated as an important threat to Long-tailed Duck, Velvet Scoter, Steller's and Common Eider in the Baltic Sea and North Sea Coast (Skov *et al*. 2011). In the Netherlands, over-fishing of Blue Mussel lead to a mass mortality of Common Eiders in 1999/2000, as starving birds were not able to find sufficient food (Camphuysen *et al*. 2001). A thorough understanding of all these interacting factors on seabird prey is still lacking, and represents an important knowledge gap.

- *Climate change*

As described above, climate change is altering ecosystem dynamics with observed changes in forage fish distribution, abundance, and spawning timing within the North Sea, under warmer sea surface temperatures. These changes in forage fish abundance, distribution and quality are impacting a range of seabirds, notably Auks, Skuas, Tern species and the Black-legged Kittiwake. Climate change models suggest that, by the end of this century, Great Skua and Arctic Skua will no longer breed in the UK and the range of Black Guillemot, Common Gull and Arctic Tern will shrink to such a degree that on only colonies in the Shetland and northern Scotland will remain (Mitchell and Duant, 2010).

In the Baltic Sea, sea surface temperatures have continued to increase, with reduced sea ice in the northern region of the sea basin. Seaducks and other waterbirds have been found to have altered their distribution between 1988-1993 and 2007-2008, with shifts northwards observed in the Great Crested Grebe, Great Cormorant, Greater Scaup, Common Scoter, Common Goldeneye, Goosander and Red-breasted Merganser (Skov *et al*. 2011) as larger areas remain ice free over winter. Declines in abundance have also been noticed in many of these species during this period, although the linkage between declines and changing climate are poorly understood. In particular, there is large gap in knowledge relating to the impacts of climate change in the Russian breeding grounds, which are likely to have a stronger impact on sea duck population numbers in comparison to the wintering areas (Skov *et al*. 2011).

The impact of increasing sea surface temperature on the Blue Mussel and other bivalves species in the Baltic Sea and south Eastern North Sea is also poorly understood. These and other bivalve species are

important prey items for wintering seaducks, so this represents an important knowledge gap- particularly when designating Marine Protected Areas for benthic habitats.

In addition to impacts on breeding success and foraging, climatic changes are linked to severe storms across the Northern European Seas which can also cause mortality of seabirds. Severe storm events in the East Atlantic, strongly associated with the North Atlantic Oscillation, can severely impact adult seabird survival. The most recent severe winter storm was in 2013/2014 and resulted in wrecks of thousands of dead Atlantic Puffins and other Auk species along the coastlines of Ireland, UK , France, Spain and Portugal.

- *Bycatch*

Seabird bycatch in the North Sea and Celtic Seas is poorly understood, as few studies have focused on this issue within the region.

Longline bycatch:
Dunn & Steel (2001) conducted a thorough review of known seabird bycatch in longline vessels in the North East Atlantic. High numbers of AEWA listed seabirds (e.g. Auk species) were found to have been caught in the Norwegian salmon longline fishery, which has since been closed. The most common seabird caught in both pelagic and demersal longlines within the North Sea region was the Northern Fulmar[50] with incidental records of bycatch for gull species and Northern Gannet. Within the Celtic Seas, the Gran Sol region is an important demersal longline fishery, which mostly targets Hake. A 2011 study (Solla *et al*. 2011) with on-board observers on Spanish vessels recorded bycatch of Northern Gannet and Black-legged Kittiwake as well as Northern Fulmar. The seabird bycatch of this fishery (for AEWA and non-AEWA listed seabirds) represents a key knowledge gap for the region. In addition updated surveys are needed for bycatch in longlining vessels across the North Sea and Baltic Seas.

Gillnet bycatch:

Gillnet bycatch is a major threat to seabird species within the region (Zydelis *et al*. 2013). Large numbers of seabirds are known to be killed across the Baltic Sea, with an annual estimate of 76,000 seabirds killed across the sea basin (Zydelis *et al*. 2009 & 2013). Intensive gillnet fisheries operate throughout the year in the Baltic, targeting species such as cod and smelt. Cormorants, divers, seaducks, loons, grebes and Auks are highly vulnerable to being caught in gillnets (Zydelis *et al*. 2013).

During autumn and early winter the migration of thousands of seaducks to the region results in the estimated mortality of thousands of birds, such as the Long-tailed Duck, Velvet Scoter and Common Eider. Within the Baltic Sea, seaducks are mostly distributed in high numbers along the coasts of Denmark, Germany, Poland, Russia (Stalingrad), Lithuania, Latvia and Estonia.

Auks are distributed in highest densities off Denmark, Sweden, and Germany. Zydelis *et al*. (2009) investigated the potential of population level impacts from gillnet bycatch and found that this was likely for Greater Scaup, Common Murre and Long-tailed Duck within the region.

- *Pollution- oil spills*

As described in previous sections of this report, oil pollution can cause seabird mortality during spill events, causing drowning, hypothermia and starvation. It is also a source of poison, with potential for long term impacts on reproduction and survival. The Northern European Seas are particularly at risk due to the large amount of shipping traffic and oil exploration and extraction. Within the region, Auks, cormorants, seaducks, loons and grebes are particularly sensitive to oil pollution as they spend large amounts of time on the sea surface. The Baltic Sea, which is a highly sensitive, enclosed system, has

[50] N.B. The Northern Fulmar is not listed under the AEWA Agreement.

experienced a number of oil spill events each decade from the 1960s onwards. In 1969, for example the Palva, a Russian tanker, spilt ~150 tonnes of oil off Finland, which caused the death of 25% of the locally breeding Common Eider population (Rousi & Kankaanpää, 2012). According to Bellebaum *et al*. (2011) the incidence of small discharges from ships remains intolerably high in the Baltic Sea and it is estimated that several tens of thousands of Long-tailed Ducks are oiled and potentially die each year in the Baltic Sea because of the many small oil spills along the major shipping routes.

A major oil spill event in the northern Baltic during the breeding season could have devastating impacts on breeding birds, whilst an event in winter in the southern region could kill thousands of seaducks, loons, grebes etc (Rousi & Kankaanpää, 2012).

- *Legal hunting*

Within the EU, species listed on Annex II of the Birds Directive can be legally hunted. There are 17 AEWA seabird species known to be legally hunted in the Temperate Northern Atlantic Seas Area of which 14 species are hunted in EU countries (see table 10). Most of the seabird species listed below are hunted in the Baltic Sea States and Northern European countries. Statistics on annual catch are poorly recorded across the region and this represents a major knowledge gap. It is also unknown the degree to which illegal hunting impacts seabird species within the region. Of particular interest should be the migratory species which are also exposed to legal and illegal harvesting in the Arctic and other eco-regions covered by AEWA, as well as for species with high levels of mortality from human activities (fisheries bycatch for example)..

Table 10, Legally hunted AEWA seabird species in countries in Northern Atlantic Waters, and in other regions including EU and non EU countries (Y=denotes hunting present in a country) [51]

Species	Countries												
	UK	DE	DK	LI	EE	LV	SE	FI	PL	NL	FR	IR	Other
Greater Scaup	y	y	y		y	y					y		Iceland
Common Goldeneye	y		y	y	y	y	y	y			y	y	Hungary Austria Morroco
Long-tailed Duck			y		y	y		y			y		Iceland
Common Scoter		y	y		y	y	y				y		Morocco
Velvet Scoter		y	y		y	y					y		
Black Scoter													
Goosander			y				y	y					
Red-breasted Merganser			y				y	y					Iceland
Common Eider			y		y	y	y				y		Greenland Norway Russia Canada
Red-throated Loon													Morocco
Arctic Loon													Morocco
Common Loon													Morocco Greenland Russia
Herring Gull		y	y		y		y						Spain, Czech Rep. Iceland Norway Russia? Faroe Islands
Mew Gull		y			y		y						Norway Russia? Faroe Islands
Lesser Black-backed Gull		y	y										
Great Black-backed Gull		y	y		y		y						Greenland Norway Russia? Faroe Islands
Black-headed Gull		y			y								Spain Slovakia Iceland Faroe Islands Russia?
Caspian Gull													Spain

Within the Baltic Seas region, the Regional Seas Convention HELCOM (Helsinki Convention) has summarised the maximum bag limits for the annual legal harvest for the following seabird species, see Table 11 below.

[51] Information compiled by BirdLife International & from the Artemis Database

Table 11, Maximum bag limits for seabird species estimated across hunting countries & annual harvest estimates where available (shown in brackets)

Species	EU Seabird legal bag limits by Mooji 2005 & HELCOM for Baltic region
Long-tailed Duck	24,000
Common Eider	116,000 bag limit; (Baltic Sea 60,000)
Common Goldeneye	122,000 bag limit. (Baltic Sea 60,000)
Greater Scaup	2010
Goosander	16,146
Red-breasted Merganser	8,617
Common Scoter	5,682
Velvet Scoter	6,727
gull species (Herring Gull, Lesser Black-backed Gull, Greater Black-backed Gull, Common Gull)	Up to 100,000

- *Renewable energy*

Offshore wind farms pose a threat to some seabird species, due to the risk of collision with rotor blades during flight; displacement from migratory pathways and key habitat (Desholm and Kahlert, 2005) and disturbance and habitat loss. There are few empirical studies of each of these potential effects, and even fewer assessments of population-level impacts (Norden 2010). The Northern European Seas ecoregion contains large numbers of offshore wind farms in comparison to the rest of the AEWA region. Figure 8 below from the European Commission's European Marine Atlas indicates the current operational offshore wind farms and those currently under construction. The existing wind farm regions overlap with high levels of seabirds and many marine Important Bird Areas.

There is a considerable body of research on the theoretical impact of offshore windfarms on seabird species dating from the early 2000s in the Netherlands, Germany and UK (e.g. Desholm & Kahlert, 2005; Garthe *et al*. 2004). Bradbury *et al*. (2014) have developed a GIS tool, called SeaMast, to assess the sensitivity of seabirds to windfarms. Their analysis, which was conducted on seabird species in south east England, assessed a number of seabird species according to their risk of colliding with wind turbines, or being displaced from foraging areas by wind farm location. This is summarised in Table 12. The conservation importance and density of the species within English Territorial Seas was also factored into the analysis which identified the most susceptible species to collision- and therefore mortality- from wind farms. The most susceptible were the large Gull species (Herring Gull, Great Black-backed Gull, Lesser Black-backed Gull), with a number of other Gull species and Northern Gann*et al*so considered at high risk. It is important that these theoretical models are tested empirically to determine species specific behavioural responses and risk.

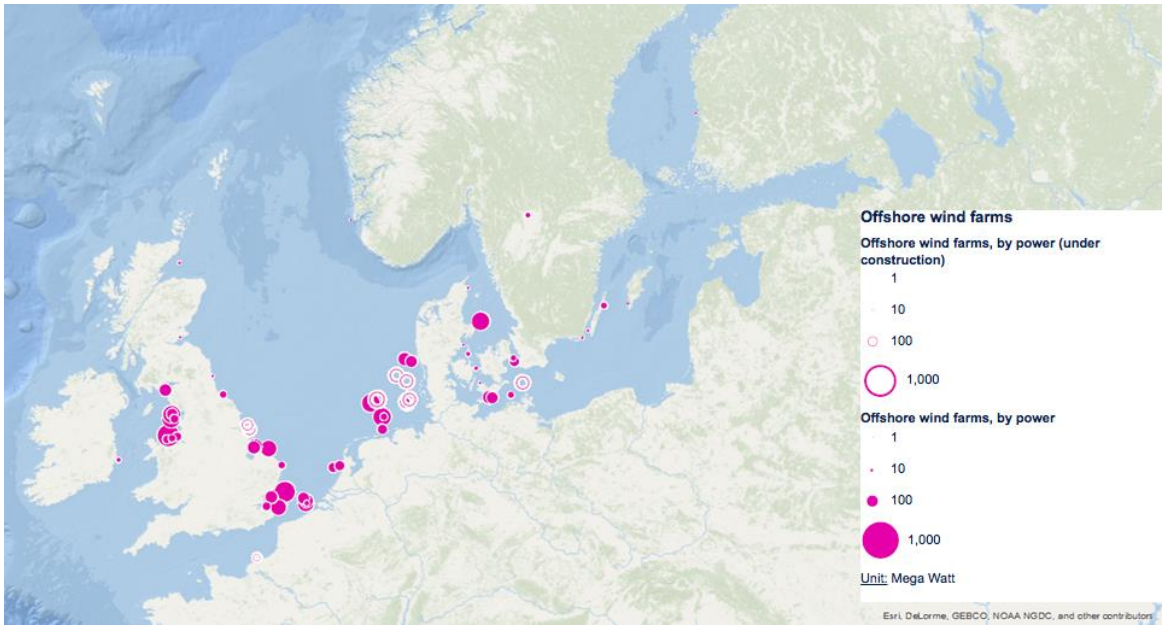

Figure 8, Adapted from the European Marine Atlas, showing offshore wind farms in operation and under construction (2015 update)[52]

In addition to offshore wind farms, there is the possibility that future 'wet renewables', such as tidal and wave energy platforms could affect seabird populations (Furness *et al*. 2012). The most susceptible species to wave energy devices are likely to be Black Guillemot, Razorbill, Common Murre, Great Cormorant, the Atlantic Puffin and loons (Furness *et al*. 2012). However these forms of renewable energy are still in their infancy, and are likely to have less impact than offshore wind farms (Furness *et al*. 2012).

[52] The European Marine Atlas can be found here http://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/#lang=EN;p=w;pos=16.017:58.854:5;bkgd=5:1;gra=0;mode=1;theme=88:1:1:1;

Table 12, Seabird species specific risk rating for collision and displacement from offshore wind energy- adapted from an English case study (Bradbury *et al*. 2014)

Species (Common Name)	**Collision risk**	**Displacement risk**
Herring Gull	Very high	Very low
Great Black-backed Gull	Very high	Low
Lesser Black-backed Gull	Very high	Very low
Iceland Gull	High	Very low
Glaucous Gull	High	Very low
Mew Gull	High	Low
Mediterranean Gull	High	Very low
Northern Gannet	High	Very low
Black-legged Kittiwake	High	Very low
Black-headed Gull	Moderate	Low
Sandwich Tern	Moderate	Moderate
Little Gull	Moderate	Very low
Little Tern	Moderate	Moderate
Common Tern	Moderate	Low
Great Skua	Moderate	Very low
Roseate Tern	Moderate	Moderate
Black Tern	Moderate	Low
Arctic Loon	Moderate	High
Red-throated Loon	Moderate	High
Common Loon	Moderate	High
Red-necked phalarope	Moderate	Very low
Sabine's Gull	Moderate	Very low
Great Cormorant	Low	Moderate
Long-tailed Skua	Low	Very low
Arctic Tern	Low	Low
Common Goldeneye	Low	Moderate
Goosander	Low	Moderate
Greater Scaup	Low	Moderate
Red-breasted Merganser	Low	Moderate
Common Scoter	Low	High
Velvet Scoter	Low	Moderate
Common Eider	Low	Moderate
Horned Grebe	Low	Moderate
Great Crested Grebe	Very low	Low
Common Guillemot	Very low	Moderate
Razorbill	Very low	Moderate
Atlantic Puffin	Very low	Low
Black Guillemot	Very low	Moderate
Little Auk	Very low	Very low
Long-tailed Duck	Very low	Low

- *Predation from introduced predators*

Seabirds in the region are predated upon by native species such as from gulls, skuas and Red Fox. Whilst this predation impact might be severe for some local populations, the threat from introduced mammalian predators such as rats, feral cats, ferrets and American Mink and Raccoon Dog is known to be having an additional and widespread impact across the region's seabirds (Bellebaum *et al*. 2012; Bodey *et al*. 2010; Jones *et al*. 2008). The Black Rat inhabits important seabird breeding islands such as the Shiant Isles, where Atlantic Puffins, Common Murres and Razorbills breed in large numbers (RSPB 2015). Auks, such as ground-dwelling and burrowing species (e.g. Puffins) are particularly at risk from rat and mice predation during breeding (Jones *et al*. 2008).

The European Polecat also inhabits a few islands in the British Isles, with documented predation on breeding seabirds on Rathlin Island (Northern Ireland) (Bodey *et al*. 2010). The American Mink has invaded large areas across Northern Europe, including the British Isles, southern Norway and the Baltic Sea as animals escaped fur farms (Nordstrom *et al*. 2003; Bonesi & Palazon, 2007). Seabird species particularly affected by mink predation include: Black guillemot, Arctic Tern , Common Tern, Black-headed Gull, Common Gull, Common Eider, Horned Grebe, Velvet Scoter, Red-breasted Merganser (in Bonesi & Palazon, 2007). There are current eradication projects underway in some of the UK's islands.

- *Eutrophication*

Eutrophication is of particular importance to the Baltic Sea, and the large populations of over-wintering seaducks and waterbirds. The Baltic Sea Basin has seen large scale increases in dissolved inorganic nitrogen and phosphorus from agricultural and industrial run-off (Skov *et al*. 2011). This has led to oxygen depleted areas, and long term changes in phytoplankton- including toxic algal blooms which have caused localised die off of benthic organisms and fish.

Very little work has been undertaken to look at the impact of eutrophication on bivalve species such as the Blue Mussel- the main prey for many of the sea duck species (e.g. Long-tailed Duck). Increases in nutrient levels may assist productivity and growth in bivalves in regions exposed to more hydrologic mixing, however in areas that are more enclosed with very little mixing the bivalve species may suffer from increased mortality (Bellebaum *et al*. 2012; Skov *et al*. 2011).

In addition, the impact of eutrophication and climate change on bivalves, and subsequently on feeding birds is poorly understood and represents a key gap in knowledge.

- *Contaminants and marine litter*

Contaminants such as organochlorine pesticides, polychlorinated biphenyls (PCBs), polychlorodibenzodioxins (PCDDs), polychlorodibenzofurans (PCDFs), mercury and selenium, are present within the marine and terrestrial environment and enter the food chain and are accumulated by seabirds. Within the Northern European Seas, many migratory seabird species show indications of high contaminant levels (e.g. Common Scoter, Common Eider, Common Murre, Arctic and Common Terns (Camphuysen *et al*. 2002; Michelutti *et al*. 2010, Siebert *et al*. 2012). The contaminant levels within eggs of Common Tern have been found to impair reproduction (Castillo 1994). For other seabird species, such as the Common Scoter, contaminants are believed to have stronger effects on starved birds- based on levels found in mass wrecks of birds along the Dutch coast (Camphuysen *et al*. 2002).

Contaminant levels in Common and Arctic Tern eggs are used as an indicator of contaminant levels in the North Sea as part of the Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR). The impact of contaminants on seabird survival requires further research, particularly in the context of multiple threats and stressors reducing resilience of bird populations.

Marine litter, particularly plastic, is known to be ingested by seabirds either directly or indirectly through the food chain, and is a source of toxicity to birds (Andrady 2011). Studies of the Northern Fulmar in the North Sea have consistently found high levels of plastic ingestion, with the English Channel and east England the areas with the highest amounts (OSPAR 2014). Ingestion of plastics by other seabird species is poorly known and is an important knowledge gap.

Entanglement in marine litter also occurs, with Northern Gannet, Herring Gull, Great Black-backed Gull, Black-headed Gull, Common Eider, Common Murre, Black legged Kittiwake, Red-throated Loon and Great Cormorant regularly recorded dead and entangled along the North Sea coast (Fleet *et al*. 2009; Lozano & Mouat, 2009). Further research is needed on the impact of marine litter on seabirds, particularly for other seabird species and at regional scales.

- *Disturbance on land and at sea*

As described in previous sections, many of the AEWA seabird species are vulnerable to human disturbance. At important breeding colonies within the region, ground nesting seabirds may be at particular risk from recreational and leisure activities- although this is currently considered to be a low threat in the region (Mitchell & Daunt 2010).

Disturbance at sea, from shipping, energy production, mining and fishing can effectively reduce habitat available for seabird species. Seabird species respond to at sea disturbance differently. A study in the North Sea found Loon species showing clear avoidance of shipping lanes. The Common Scoter was most vulnerable to disturbance, with the shortest flush distances as ships approached and the longest time away from optimal habitat. The study found that Common Eiders were more tolerant, although in some cases were disturbed at distances of over three kilometres (Schwemmer *et al*. 2011).

Conservation Actions underway:

- ***Marine Important Bird Areas***

The current network of marine IBAs for each species is indicated in Appendix II. The marine IBA network across the northern European seas is well established in the Baltic Sea, particularly for seaduck species. Both oastal areas surrounding breeding colonies and pelagic sites are lacking for auk species (Atlantic Puffin, Common Murre in particular). Pelagic areas for wintering auks are also lacking. Coastal wintering sites for seaduck species (e.g. Long-tailed Duck, Goosander, Red-breasted Merganser and Velvet Scoter) need further development in the North Sea and Celtic Seas. There is ongoing work by BirdLife partners across the region to identify further marine IBAs for seabirds. This includes:

- Estonia:

Inventory of marine shallows of Tallinn Bay (key species, Long-tailed Duck) in 2013/2014 for other areas of Estonian coast and Gulf of Finland in 2015/2016 (Long-tailed Duck and loon species)[53]

- Finland

Identification of offshore IBAs for Long-tailed Duck, Velvet Scoter and Common Eider. Satellite tracking of Arctic Loons to identify movements and wintering areas & breeding areas in central Finland)

- Lithuania

[53] See http://elfond.ee/et/teemad/meri/laeaenemere-kaitse/merekaitsealad-ja-moistlikum-merealade-kasutuse-planeerimine/elupaigad

Lithuanian Ornithological Society and Lithuanian Government identified offshore sites for Long-tailed Duck in 2014 under the LIFE DENOFLIT[54] project. This project is now complete and resulted in the designation of a new Special Protection Area for Birds under Natura 2000.

- United Kingdom

Identification of marine IBAs in inshore and offshore areas, including off Scotland (FAME/STAR[55] project)

- ***Marine Protected Areas:***

Existing marine and coastal protected areas (Natura 2000 network) are indicated in Appendix IV. The Convention on Biological Diversity's programme to identify Ecologically and Biologically Significant Areas (EBSAs) within the North East Atlantic has not resulted in any finalised or adopted sites within the region, despite a workshop to define areas.

- ***Invasive predator island eradication programmes****:*
  - Royal Society for the Protection of Birds, Shiant Island Eradication Project (Black Rat eradication). [56]
  - Scottish Natural Heritage, American Mink eradication project on Hebrides[57].

- ***Species Action Plans***:
  - Long-tailed Duck International Species Action Plan (Hearn *et al*. 2015).
  - European Species Action Plan for Steller's Eider (Polysticta stelleri)[58]
  - International (East Atlantic) Action Plan- Roseate Tern Sterna dougallii[59]
  - LIFE EURO SAP project (BirdLife International, 2015-2017), developing an International Species Action Plan for Velvet Scoter[60]

- ***Bycatch mitigation***
  - Seabird Task Force[61], collaborative project led by BirdLife International (with Lithuanian Ornithological Society[62] and RSPB), includes engagement of Lithuanian gillnet fishers, on-board surveys of gillnet bycatch and testing of mitigation measures.
  - Gillnet replacement with longlines (NABU- BirdLife in Germany lead project on gear replacement to reduce bycatch in German Baltic coast)[63].

- ***Marine litter reduction***

[54] LIFE DENOFLIT Project- Marine Conservation in Lithuania, http://corpi.ku.lt/denoflit/index.php?page=home
[55] The Future of the Atlantic Marine Environment FAME project, http://www.fameproject.eu/en/
[56] RSPB rat eradication project on Shiant Islands http://www.rspb.org.uk/joinandhelp/donations/campaigns/shiantisles/work/index.html

[57] Scottish Natural Heritage mink eradication project. http://www.snh.gov.uk/land-and-sea/managing-wildlife/hebridean-mink-project/

[58] http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/polysticta_stelleri.pdf
[59] http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/sterna_dougalii.pdf
[60] BirdLife International LIFE EURO SAP Project ongoing, beginning in 2015
[61] Seabird Task Force, www.seabirdbycatch.com
[62] Lithuanian Ornithological Society LOD, www.birdlife.lt

[63] NABU (BirdLife Germany) bycatch project https://www.nabu.de/natur-und-landschaft/meere/fischerei/umweltschonende-fischerei/15425.html

NABU (BirdLife in Germany) carries out a 'fishing for litter' project, with engagement of local fishermen to actively fish and remove marine litter from the sea [64]

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 13 provides a summary of the existing MEAs that exist in the region and relate to mitigation of key threats to seabirds and northern European marine biodiversity.

[64] NABU (BirdLife Germany) Fishing for litter project, https://www.nabu.de/natur-und-landschaft/aktionen-und-projekte/meere-ohne-plastik/fishing-for-litter/index.html

Table 13, Main international & regional frameworks & organisations in Northern European seas focused on relevant threats to AEWA listed seabirds and conservation actions

MEAs, Conventions, Organisations	Countries (Contracting Parties, Member States, Partners)	Fisheries Management, fish stocks & bycatch	Climate change	Oil spill	Harvesting	Marine spatial planning, including energy & tourism	Introduced predators	Eutrophication	Contaminants & litter	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
OSPAR[65]	Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom		✓	✓	✓				✓	✓	✓
HELCOM[66]	Denmark, Estonia, the European Union, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.	✓	✓	✓		✓	✓	✓	✓	✓	✓
European Commission Common Fisheries Policy Directives, Policies[67]	All EU Countries	✓									
European Commission, Birds Directive[68]	All EU Countries	✓			✓		✓			✓	✓
EC, Marine Strategy Framework Directive[69]	All EU Countries	✓		✓		✓	✓	✓	✓	✓	
EC, Maritime Spatial Planning Directive[70]	All EU Countries					✓					
Fisheries Advisory Councils[71]	All EU Countries	✓									
Nordic Council of Ministers[72]			✓	✓	✓	✓	✓		✓	✓	✓
RAMSAR[73]	All EU countries + Norway, Russia										

CBD- EBSA[74]	All countries in region										
CMS[75]	All countries except Russia			✓	✓						
NEAFC[76]	Denmark (Faroe Islands, Greenland), Iceland, Russia, Norway, European Union				✓						
ICES [77]					✓						
IMO Marpol[78]	All countries					✓				✓	
Bonn Agreement[78a]	Belgium, Denmark, France, Germany, Ireland, The Netherlands, Norway, Sweden, UK, European Union.										
BirdLife International & partners [79]b	Partners in all countries except Russia	✓					✓			✓	✓

Explanation of MEA/Convention/Organisation names and roles.

[65] The Convention for the Protection of the marine Environment of the North-East Atlantic **(OSPAR),** http://www.ospar.org works to protect the marine environment through six main strategies- Biodiversity and Ecosystem Strategy, the Eutrophication Strategy, the Hazardous Substances Strategy, the Offshore Industry Strategy and the Radioactive Substances Strategy, together with a Strategy for the Joint Assessment and Monitoring Programme

[66] Helsinki Convention (HELCOM) for Baltic Sea countries, including HELCOM Red List species, http://www.helcom.fi/baltic-sea-trends/biodiversity/red-list-of-species/red-list-of-birds , BALTFISH fisheries management forum http://helcom.fi/action-areas/fisheries/management/baltfish , pollution and marine protected areas work http://www.helcom.fi/

[67] The European Union's Common Fisheries Policy (CFP) http://ec.europa.eu/fisheries/cfp/index_en.htm, & Seabird Plan of Action http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437554212028&uri=CELEX:52012DC0665

[68] The Birds Directive, the Natura 2000 network of protected sites, http://ec.europa.eu/environment/nature/natura2000/index_en.htm,

[69] The Marine Strategy Framework Directive (MSFD) http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm,

[70] The Maritime Spatial Plan Directive (MSP) http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm

[71] The North Western Waters Advisory Council, http://www.nwwac.org/english North Sea Advisory Council, http://www.nsrac.org/ Baltic Sea Advisory Council http://www.bsac.dk/mod_inc/?P=itemmodule&kind=front

[72] The Nordic Council Action plan for seabirds in Western-Nordic areas: prioritises seabird conservation action for the region http://norden.diva-portal.org/smash/record.jsf;jsessionid=9zef5MwA1u_AI1NncruJ8oRHzIGpXy-KBqxb06M_.diva2-search3-vm?pid=diva2%3A701212&dswid=-6450

[73] The Convention on Wetlands of International Importance **(RAMSAR)** http://www.ramsar.org works towards the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

[74] The Convention on Biological Diversity **(CBD)** aims to protect biological diversity through high level policy, including targets for marine protected areas. The CBD has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the North East Atlantic, although no sites have been adopted https://www.cbd.int/ebsa/

[75] The Convention on Migratory Species **(CMS)** http://www.cms.int/en/documents/strategic-plan/welcome under the aegis of the United Nations Environment Programme, provides a global platform for the conservation and sustainable use of migratory animals and their habitats.

[76] Regional Fisheries Management Organisation (RFMO). There is one RFMOs of relevance to the region. This is the North East Atlantic Fisheries Commission (**NEAFC**), http://www.neafc.org/, The NEAFC manages fisheries in the high seas areas of the North East Atlantic, There is currently no programme or work package dedicated to minimising seabird bycatch, or in implementing the Food and Agriculture Organisation Plan of Action for seabird bycatch.

[77] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[78a] The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causeshttp://www.imo.org/en/Pages/Default.aspx

[78b]The Bonn Agreement http://www.bonnagreement.org/ is the mechanism by which the North Sea States, and the European Union (the Contracting Parties), work together to help each other in combating pollution in the North Sea Area from maritime disasters and chronic pollution from ships and offshore installations; and to carry out surveillance as an aid to detecting and combating pollution at sea.

[79] BirdLife International Marine Programme, www.birdlife.org, Seabird Task Force www.seabirdbycatch.com

Conservation Action needed:

- Identification of offshore marine IBAs in Baltic Sea, North Sea and Celtic Sea and designation as Marine Protected Areas
- Management of existing MPA network, including fisheries management, bycatch reduction and monitoring.

Knowledge Gaps & Research Needs

- Interaction between climate change (sea surface temperature), plankton, forage fish and seabirds, both within the breeding and non-breeding season.
- Winter distribution of seabird species breeding in North Sea and Celtic Seas.
- Winter distribution and movement across Northern European Seas region for sea duck species, including links between Arctic breeding populations and winter aggregations.
- Threats to sea duck species breeding in the Arctic Tundra (e.g. Long Tailed Duck, Velvet Scoter, Common and Steller's Eider).
- Interaction between seabirds and offshore wind turbines as validation of theoretical models.
- Cumulative impact of wind farms across the region
- Longline and gillnet bycatch rates, seasonality of catch, species affected in North Sea
- Longline bycatch rates, seasonality of catch, species affected in offshore Celtic Seas area (Gran Sol).
- Establish effective gillnet bycatch mitigation measures.
- Determine total legal annual harvest of seabird species across region, and population/flyway level assessment of sustainable catch limits.
- Impact of intensive fishing on available prey (forage fisheries)
- Impact of fisheries discard ban on seabirds
- Legal and illegal harvest rates for seabirds in eco-region.

Recommendations for regional action

- Collection of legal hunting data from National Governments, through AEWA national reporting schedule or existing regional MEAs.
- Collection of illegal hunting estimates National Governments, through AEWA national reporting schedule or existing regional MEAs.
- Collection of seabird bycatch records from National Governments, through AEWA national reporting schedule or existing regional MEAs
- Regional and flyway analysis of legal and illegal harvest and other causes of large scale mortality.

Lusitanian Eco-region

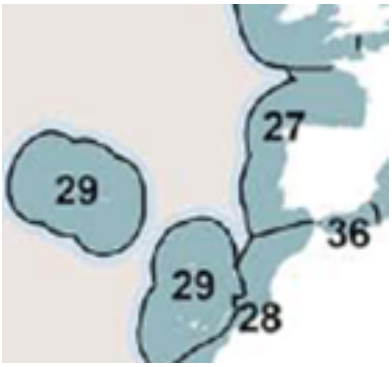

Figure 9, Area of focus in Lusitanian eco-region. Adapted from Spalding *et al*. (2007)

The North Atlantic European region, which for the purpose of this review extends from western France, south to Morocco and Western Sahara, including the islands of the Azores, Madeira and Canaries, is important for breeding tern and Gull species and wintering auks, seaducks, loons and grebes.

There are 40 seabird species whose range extends into the Lusitanian region (Table 14), of which 15 species have populations declining at the global level. One species, the Audouin's Gull is Near Threatened, and the Velvet Scoter which winters along the European Atlantic coastline is listed as Endangered.

At a European level, the 2015 European Red List indicates seven species are regionally threatened, and five species are Near Threatened. The Atlantic Puffin is listed as Endangered across the European region, although only Near Threatened within the European Union countries. The Common Eider is listed as Vulnerable across the European region, but Endangered within the EU countries of its range. The Caspian Tern is Least Concern globally, but is considered Near Threatened in the EU countries. The Herring Gull and Horned Grebe are considered Near Threatened at European level, but Vulnerable at EU level, while the Black-legged Kittiwake is Vulnerable at European Level but considered Endangered within the EU.

Table 14, Species in region, conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, R= Resident, Vg=vagrant)

Family	Species	Global Population trend & Global Red List Status	European Red List Status	Period of life-cycle in South European Atlantic Shelf			Period of life cycle in Azores, Canaries, Madeira			Period of life cycle Saharan Upwelling		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Alcidae	Atlantic Puffin	LC-↓	EN (NT in EU)	n	y	n	n	y	n	n	y	n
	Common Murre	LC- ↑ (US)	NT	y	y	y	n	n	n	n	y	n
	Razorbill	LC-↑	NT	y	y	n	n	y	n	n	y	n
	Black Guillemot	LC-↑ (US)	LC	n	y	n	n	n	n	n	n	n
Anatidae	Common Eider	LC- Unkwn.	VU (EN in EU)	n	y	n	n	n	n	n	n	n
	Common scoter	LC- Unkwn.	LC	n	y	n	n	y	n	n	y	n
	Velvet Scoter	EN-↓	VU	n	y	n	n	n	n	n	n	n
	Goosander	LC-↑	LC	n	n	n	n	y	n	n	n	n
	Greater Scaup	LC-↓	VU	n	y	n	n	n	n	n	n	n
	Common Goldeneye	LC- Stable	LC	n	y	n	n	n	n	n	n	n
Gaviidae	Arctic Loon	LC- ↓	LC	n	y	n	n	n	n	n	n	n
	Common Loon	LC-↓	VU	n	y	n	-	-	-	-	-	-
	Red-throated Loon	LC-↓	LC	n	y	n	-	-	-	-	-	-
Laridae	Black Tern	LC-↓	LC	y	n	n	n	n	n	n	n	n
	Common Gull-billed Tern	LC-↓	LC	n	n	n	n	n	n	y	n	n
	Roseate Tern	LC- Unkwn.	LC	y	n	n	y	n	n	n	y	n
	Caspian Tern	LC-↑	LC (NT in EU)	n	n	n	n	n	n	y	y	n
	Little Tern	LC- ↓	LC	y	n	n	n	n	n	y	y	y
	Sandwich Tern	LC- Stable	LC	y	y	n	n	y	n	n	y	n
	Lesser Crested Tern	LC- Stable		n	n	n	n	n	n	n	y	n
	Royal Tern	LC- Stable		n	n	n	n	n	n	n	y	n
	Common Tern	LC-↓	LC	y	n	n	y	n	n	n	y	n
	Little Gull	LC-↑	NT (LC in EU)	n	y	n	n	y	n	n	y	n
	Mediterranean Gull	LC- Stable	LC	n	y	n	n	n	n	n	y	n

Family	Species	Global Population trend & Global Red List Status	European Red List Status)	Period of life-cycle in South European Atlantic Shelf			Period of life cycle in Azores, Canaries, Madeira			Period of life cycle Saharan Upwelling		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Laridae	Yellow-legged Gull	LC-↑	LC	y	y	y	y	y	y	y	y	y
	Audouin's Gull	NT-Stable	LC	n	y	n	n	n	n	n	y	n
	European Herring Gull	LC-↓	NT (VU in EU)	y	y	y	-	-	-	-	-	-
	Black-legged Kittiwake	LC-↓	VU (EN in EU)	y	y	n	n	y	n	n	y	n
	Glaucous Gull	LC-Stable	LC	n	y	n	n	n	n	n	n	n
	Great Black-backed Gull	LC-↑	LC	y	y	y	n	y	n	n	n	n
	Lesser Black-backed Gull	LC-↑	LC	y	y	n	n	y	n	n	y	n
	Black-headed Gull	LC-↓	LC	y	y	n	n	y	n	n	y	n
	Mew Gull	LC-Unkwn.	LC	n	y	n	n	n	n	n	y	n
Phalacrocoracidae	Great Cormorant	LC-↑	LC	y	y	y	n	n	n	y	y	y
Podicipedidae	Horned grebe	LC-↓	NT (VU)	n	y	n	n	n	n	n	n	n
	Red-necked Grebe	LC-↓	LC	n	y	n	n	n	n	n	n	n
	Black-necked Grebe	LC-Unkwn.	LC	y	y	n	n	n	n	n	y	n
	Great Crested Grebe	LC-Unkwn.	LC	y	y	n	n	n	n	y	y	n
Stercorariidae	Great Skua	LC-Stable	LC	n	y	n	n	y	n	n	y	n
Sulidae	Northern Gannet	LC ↑	LC	y	y	y	n	y	y	n	y	y

Key threats within the Lusitanian eco-region

- *Bycatch*

Both small and large scale fisheries operate along the European Atlantic coast. There is much less information available on bycatch in fisheries operating within this region, in comparison to the Northern European Seas and even the Mediterranean Sea. There has not been extensive observer coverage on vessels however seabird bycatch is known to occur in multiple gear types. Summarised below is the current information on bycatch within EU countries. Bycatch from vessels operating within the Saharan Upwelling region of Morocco and Western Sahara represents a key knowledge gap that needs to be filled.

Trawls

Bottom and mid-water otter trawls operating in the territorial and Exclusive Economic Zones of Spain, France and Portugal regularly catch Northern Gannet, gull species, and Great Cormorant. In the English Channel, mid-water trawls targeting seabass also catch Common Murre, Razorbill and Great Cormorant. The French anchovy fishery has recorded bycatch of various gull species (ICES 2013)

Longlines (pelagic and demersal)

Drifting pelagic longlines targeting tuna in the waters of Spain, Portugal and France catch Northern Gannet and Yellow-legged Gull amongst other species (e.g. shearwater species) (ICES, 2013).

Demersal longlining is widespread across the region in both commercial and artisanal fleets. Seabird bycatch is known to occur in the Gran Sol fishery (described in the Northern European Seas section above), however the bycatch from other fishing areas e.g. the Bay of Biscay is poorly known (ICES, 2013). In Portugal, many of the vessels are 'polyvalent' in which multiple fishing gears are used and switched according to the target catch. These polyvalent fishing vessels caught more birds per unit of effort when demersal longlining and the majority of which were Northern Gannet (Oliveira *et al*. 2015).

Purse seines

The study of Oliveira *et al*. (2015) in Portugal recorded Northern Gannet, Great Cormorant and Common Scoter caught in purse seines. Seabird mortality has also been recorded in the Spanish purse seine fishery (ICES, 2013). Bycatch in purse seines has not received much attention, and represents an important knowledge gap both within this region and other regions covered by AEWA.

Gillnets:

There is regular and widespread seabird bycatch across the region in gillnets that includes auks, Northern Gannet, cormorants, seaducks, and loons (ICES, 2013; Zydelis *et al*. 2013; Oliveira *et al*. 2015). Local impacts could be severe- Munilla *et al*. (2007) linked the collapse of the Common Murre population in the Iberian coast to gillnet fisheries, following the introduction of synthetic netting material (Zydelis *et al*. 2013).

Beach and boat seine

Bycatch of Common Scoter and Black-headed Gull have been recorded in the Portuguese fishery (Oliveira *et al*. 2015), although the extent of this type of fishery across the region is poorly known, as is the scale of the bycatch problem.

- *Oil spills*

This region includes major ports and shipping routes, and therefore has a risk of oil spill events. Two recent oil spills occurred in the Bay of Biscay. One was within the non-breeding areas of auks from colonies in Britain, Ireland and France - the Erika (Brittany, France, December 1999). The second was in Galicia, Spain (the Prestige), 2002, in which 60,000 tonnes of oil leaked into the ocean- in a region which is important foraging area for non-breeding seabird species. The Prestige oil spill caused a mass mortality of seabirds, including Common Murre, Razorbill, Atlantic Puffin, loons and cormorants (Garcia *et al*. 2003; Munilla *et al*. 2011). A recent oil spill in the Canary Islands occurred in April 2015[80]

[80] See The Guardian Report, http://www.theguardian.com/world/2015/apr/24/spanish-fuel-oil-spill-russian-oleg-naydenov-gran-canaria

from the sinking of the Russian trawler Oleg Naydenov, although precise accounts of seabirds affected are not yet available (SEO/BirdLife, personal communication).

- *Renewable energy*

There are currently a relatively small number of active, full commissioned offshore wind farms within the Lusitanian region, including in France, Spain, Portugal and the Canary Islands. Planning and construction is underway in France[81], Spain[82] and Portugal[83] to build numerous wind farms along the coast, greatly increasing the wind energy capacity of the region. Threats to seabirds and information gaps are consistent with those described in the Northern European Seas section of this review (see previous section). Very little information is available on the potential for cumulative impacts from wind farms, particularly in the context of major migratory routes such as in the case of the Lusitanian region (Cruz and Simas, 2012).

- *Predation by native species and invasive predators*

Within the Lusitanian region, the Threatened Island Biodiversity Review has identified the Berlangas Islands on mainland Portugal, the Azores Islands and Madeira and Canary Islands as islands where seabirds are particularly threatened (Spatz *et al*.2014),

On mainland Portugal, the Berlengas Islands provide breeding habitat for Common Murre, Cormorant, Yellow-legged Gull and Lesser Black-backed Gull. The islands are also inhabited by rats which are currently the focus of an eradication programme (SPEA, personal communication).

The Azores, Madeira and Canary Islands all hold invasive predators, such as rats and cats (Spatz *et al*. 2014), however the impact on AEWA seabird species is not well known.

The Azores holds regionally important numbers of Roseate Tern, however the species is particularly vulnerable to predation from native avian predators such as European Starlings and Yellow-legged Gulls. Predation can impact heavily on reproductive success for entire colonies of the species (Neves *et al*. 2006).

- *Disturbance from shipping, including light pollution*

Light pollution from shipping presents a risk to seabird species, including those listed under AEWA, as they can become disorientated and collide with ships. Further research is needed to determine species specific impacts of light pollution within the region and the threat to AEWA listed seabirds (e.g. the risk for night foraging species). This represents an important knowledge gap.

Conservation Action underway:

[81] See France's offshore wind farm database here: http://www.4coffshore.com/windfarms/windfarms.aspx?windfarmid=FR34
[82] See Spain's offshore wind farm database here http://www.4coffshore.com/windfarms/gamesa-5mw-test-turbine-%28onshore%29-spain-es50.html
[83] See Portugal's offshore wind farm database here: http://www.4coffshore.com/windfarms/windfarms.aspx?windfarmid=pt01

- ***Marine Important Bird Areas***

The existing marine IBAs for each of the AEWA listed seabirds can be seen in Annex II in combination with their breeding and non-breeding range.

Current activity:

INTERREG- FAME project[84] (BirdLife Partners: BirdWatch Ireland, RSPB, SPEA, SEO) identification of marine IBAs, site management, bycatch monitoring, wind farm sensitivity analysis)

- ***Marine Protected Areas***

The current Natura 2000 network and the overlay with marine Important Bird Areas is provided in Appendix IV.

- ***Species Action Plans***

International (East Atlantic) Action Plan Roseate Tern Sterna dougallii [85]

- ***Island restoration:***
  - LIFE+ Berlengas. Includes rat eradication on Berlengas, carried out by SPEA (BirdLife Portugal),
  - LIFE+ Corvo: Sterilisation of cats and eradication of rats in Corvo, Azores (SPEA, BirdLife Portugal)
  - LIFE Illhas de Porto Santo, rat eradication project in Madeira.
  - LIFE SafeIslands for Seabirds (Initiating the restoration of seabird driven ecosystems in the Azores, 2009-2012)
  - Artificial nest box provision for Roseate Terns in the Azores.

- ***Bycatch monitoring & mitigation***
  LIFE + MarPro, on board surveys of fishing vessels in coastal Portuguese waters (SPEA, BirdLife Portugal) and future mitigation trials to reduce bycatch.[86]

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 15 provides a summary of the existing MEAs that exist in the region and relate to mitigation of key threats to seabirds and northern European marine biodiversity.

[84] The Future of the Atlantic Marine Environment FAME, http://www.fameproject.eu/en/
[85] http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/sterna_dougalii.pdf
[86] http://marprolife.org/index.php/en/home

Table 15, Main international & regional frameworks & organisations in Lusitanian region focused on relevant threats to AEWA listed seabirds and conservation actions

MEAs/Conventions/Organisations	Countries (Contracting Parties, Member States, Partners)	Fisheries Management, fish stocks & bycatch	Climate change	Oil spill	Harvesting	Marine spatial planning, including energy & tourism	Introduced predators	Contaminants & litter	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
OSPAR[87]	Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom		✓	✓	✓			✓	✓	✓
European Commission Common Fisheries Policy Directives, Policies[88]	All EU	✓								
European Commission, Birds Directive[89]	All EU	✓			✓		✓		✓	✓
EC, Marine Strategy Framework Directive[90]	All EU	✓		✓		✓	✓	✓	✓	
EC, Maritime Spatial Planning Directive[91]	All EU					✓				
Fisheries Advisory Councils[92]	All EU	✓								
RAMSAR[93]										
CBD- EBSA[94]	All countries in region									
CMS[95]				✓	✓					
NEAFC[96]	Denmark (Greenland & Faroe Islands), European Union, Iceland, Norway, Russia				✓					
ICES [97]					✓					
IMO Marpol[98]	All countries					✓			✓	
BirdLife International & partners [99]	Partners in all countries	✓		✓		✓	✓		✓	✓

Explanation of MEA/Convention names and roles

[87] The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), http://www.ospar.org/content/content.asp?menu=01491300000000_000000_000000

[88] The European Union's Common Fisheries Policy (CFP) http://ec.europa.eu/fisheries/cfp/index_en.htm, & Seabird Plan of Action http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437554212028&uri=CELEX:52012DC0665

[89] The Birds Directive, the Natura 2000 network of protected sites, http://ec.europa.eu/environment/nature/natura2000/index_en.htm,

[90] The Marine Strategy Framework Directive (MSFD) http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm,

[91]The Maritime Spatial Plan Directive (MSP) http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm

[92] The North Western Waters Advisory Council, http://www.nwwac.org/english , South Western Waters Advisory Council http://www.ccr-s.eu/en/qui_sommes_nous.asp provides stakeholder engagement on regional fisheries management within the EU region.

[93] The Convention on Wetlands of International Importance, RAMSAR, http://www.ramsar.org/about-the-ramsar-convention

[94] The Convention on Biological Diversity (CBD) has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the North East Atlantic, although no sites were adopted https://www.cbd.int/ebsa/

[95] The Convention on Migratory Species (CMS) http://www.cms.int/en/documents/strategic-plan/welcome

[96] Regional Fisheries Management Organisation, The North East Atlantic Fisheries Commission, http://www.neafc.org/

[97] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[98]The Marpol Convention International Maritime Organisation (IMO) for http://www.imo.org/en/Pages/Default.aspx

[99]BirdLife International Marine Programme, www.birdlife.org,

- League Protection Oiseaux (BirdLife France) https://www.lpo.fr/ ,
- Portuguese Society for the Study of Birds (SPEA) http://www.spea.pt/en/about-us/spea/ ,
- SEO/BirdLife- Spain, www.seo.org

Knowledge Gaps & Research Needs

- Numbers of birds killed as bycatch across the region
- Cumulative impact of wind farms across the region
- Level of predation by invasive predators on AEWA seabird species, particularly in France, Spain and in Azores and Madeira.
- Effectiveness of island eradication projects (methods for increasing effectiveness of eradications in temperate regions)
- Impact of intensive fishing on available prey (e.g. forage fish)
- Impact of EU fisheries discard ban on AEWA seabirds
- Impact of climate change on breeding and non-breeding birds
- Empirical testing, surveys/observation of offshore windfarms to determine species specific risk to collision and disturbance.
- Cumulative impact of wind farms on seabirds

Conservation action needed:

- Identification of offshore marine IBAs, designation as Marine Protected Areas and Ecologically and Biologically Significant Areas (or under OSPAR MPA).
- Management of existing protected areas including fisheries regulation, and implementation of bycatch reduction measures on board vessels.
- Island rat/cat eradication projects.

Recommendations for regional action

- Collection of seabird bycatch records from AEWA Parties as part of AEWA national reporting schedule
- Regional prioritisation of islands where rat and invasive predator eradications could be effective, and sharing of best practice to carry out systematic and regional eradications and monitoring.

Mediterranean and Black Sea eco-region

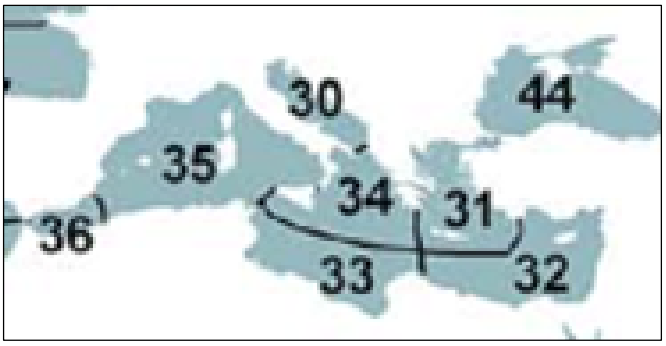

Figure 10, Mediterranean and Black Sea eco-region. Adapted from Spalding *et al*. (2007)

The Mediterranean Sea includes numerous islands which are important to breeding seabirds, including the endemic Audouin's Gull. Other breeding gull species include the Mediterranean Gull and Slender-billed Gull, Yellow-legged Gull and Black-headed and Lesser Black-backed Gull.

Thirty seven seabird species are regularly found within the region, either breeding or wintering, with additional vagrant species (e.g. Atlantic Puffin) and are listed in Table 16. The coast is important for a number of tern species, including Lesser Crested Tern, Sandwich Tern, Black Tern, Common Gull-billed Tern and Little Tern.

The Black-necked Grebe and Greater Crested Grebe also breed along the Mediterranean coast. The region, including the Black Sea is also important for non-breeding birds, including seaduck species, loons, grebes, the Northern Gannet and Great Skua.

There are 16 species within the region that have declining populations at the global level and four globally threatened species (Long-tailed Duck, Velvet Scoter, Audouin's Gull and vagrant individuals of Atlantic Puffin). The Pan-European regional Red List assessment includes eight species which are either Vulnerable or Endangered at the regional level, and a further two species which are Near Threatened.

Table 16 Species in region, conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, R= Resident,, v= vagrant)

Family	Species	Global Population trend & Global Red List Status	European Red List Status	Period of life-cycle in Western Mediterranean Sea & Alboran Sea (35 & 36)			Period of life cycle in Central & Eastern Mediterranean (30-34)			Period of life cycle in Black Sea		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
Alcidae	Atlantic Puffin	LC-↓	EN (NT in EU)	n	y (v)	n	n	n	n	n	n	n
	Razorbill	LC-↑	NT (LC in EU)	n	y	n	-	-	-	-	-	-
Anatidae	Long-Tailed Duck	VU ↓	VU	n	n	n	n	y	n	n	n	n
	Common Eider	LC-Unkwn.	VU (EN in EU)	n	n	n	n	y	n	n	n	n
	Common scoter	LC-Unkwn.	VU (EN in EU)	n	y	n	n	y	n	n	n	n
	Velvet Scoter	EN-↓	LC	n	y	n	n	y	n	n	y	n
	Goosander	LC-↑	VU	n	n	n	n	y	n	n	y	n
	Red-breasted Merganser	LC-↑	LC	n	y	n	n	y	n	n	y	n
	Greater Scaup	LC-↓	VU	n	n	n	n	y	n	n	y	n
	Common Goldeneye	LC-Stable	LC	n	n	n	n	y	n	n	y	n
Gaviidae	Arctic Loon	LC- ↓	LC	n	y	n	n	y		n	y	n
	Common Loon	LC-↓	VU	n	y	n	n	n	n	n	n	n
	Red-throated Loon	LC-↓	LC	n	y	n		y	n		y	n
Laridae	Black Tern	LC-↓	LC	y	n	n	y	n	n	y	n	n
	Common Gull-billed Tern	LC-↓	LC	y	n	n	y	y	n	y	y	n
	Caspian Tern	LC-↑	LC (NT in EU)	n	y	n	y	y	y	y	n	n
	Lesser Crested Tern	LC- Stable		n	y	n	y	y	y	-	-	-
	Little Tern	LC- ↓	LC	y	y	y	y	y	y	y	y	y
	Sandwich Tern	LC- Stable	LC	y	y	n	y	y	n	y	n	n
	Little Gull	LC-↑	NT (LC in EU)	n	y	n	n	y	n	n	y	n
	Caspian Gull	LC- Stable	LC	n	n	n	n	y	n	y	y	y

Family	Species	Global Population trend & Global Red List Status	European Red List (EU Status given where applicable & different)	Period of life-cycle in Western Mediterranean Sea & Alboran Sea (35 & 36)			Period of life cycle in Central & Eastern Mediterranean (30-34)			Period of life cycle in Black Sea		
				B	Non-B	R	B	Non-B	R	B	Non-B	R
	Mediterranean Gull	LC- Stable	LC	y	y	y	y	y	y	y	y	n
	Audouin's Gull	NT-Stable	LC	y	y	n	y	y	n	n	n	n
	Yellow-legged Gull	LC-↑	LC	y	y	y	y	y	y	y	y	y
	Slender-billed Gull	LC-↓	LC	y	y	y	y	y	y	y	y	n
	Pallas' Gull	LC-↓	LC	n	n	n	n	y	n	y	y	n
	Black-legged Kittiwake	LC-↓	VU (EN in EU)	n	y	n	n	y	n	n	n	n
	Lesser Black-backed Gull	LC-↑	LC	y	y	n	n	y	n	n	y	n
	Black-headed Gull	LC-↓	LC	y	y	n	y	y	n	y	y	n
	Mew Gull	LC-Unkwn.	LC	n	n	n	n	y	n	n	y	n
Pelecanidae	Great White Pelican	LC-Unkwn	LC	n	n	n	y	y	n	y	n	n
Phalacrocoracidae	Great Cormorant	LC-↑	LC	y	y	y	y	y	y	y	y	y
Podicipedidae	Horned grebe	LC-↓	NT (VU in EU)	n	y	n	n	y	n	n	y	n
	Red-necked Grebe	LC-↓	LC	n	n	n	n	y	n	y	y	n
	Black-necked Grebe	LC-Unkwn.	LC	y	y	y	n	y	n	y	y	n
	Great Crested Grebe	LC-Unkwn.	LC	y	y	y	y	y	n	y	y	y
Stercorariidae	Great Skua	LC-Stable	LC	n	y	n	n	y	n	n	n	n
Sulidae	Northern Gannet	LC ↑	LC	n	y	y	n	y	y	n	y	y

Key Threats in the Mediterranean and Black Sea region

- *Habitat destruction at breeding sites and important wintering areas*

The Mediterranean Sea has been inhabited by people for thousands of years, causing large scale modifications in habitat and ecosystem functioning. Coastal developments, such as for housing, tourism, ports, and recreational facilities threaten sites for breeding and wintering seabirds and damage and degrade habitats. Remote Mediterranean islands are seeing increased tourism and tourist infrastructure (e.g. Balearic Islands) which can disturb and displace breeding birds. Salt flats, estuaries and sand dunes are being degraded by human intrusion and pollution (Coll *et al*. 2010).

Habitat destruction has been identified as an important threat to breeding Audouin's Gull (Lambertini *et al*. 1994), particularly in the eastern Mediterranean, and for the Lesser Crested Tern in North Africa (Hamza *et al*. 2012). It is likely that habitat destruction is having wide-spread impacts on breeding and wintering seabirds across the region.

- *Oil spills & oil pollution*

The Mediterranean region has high levels of shipping traffic, and future oil exploration and extraction is likely. The region therefore has a high risk of oil spill events, and raised levels of chronic oil pollution. According to Fasola (in Walmsley, 2004) the most vulnerable Mediterranean seabirds include the wintering Red-throated and Arctic Loon, with Goosander, Red-breasted Merganser and Audouin's Gull also susceptible to high levels of mortality from oil spills.

- *Predation by native species and introduced predators*

It can be assumed that many of the introduced predators, such as rats, cats and foxes, have invaded the Mediterranean throughout human history. The majority of seabird breeding islands in the Mediterranean contain invasive predators- for example of 23 seabird breeding islands making up the Balearic Islands, only two are currently free of invasive predators (Spatz *et al*. 2014). The severity of impact from introduced predators on AEWA listed seabird species is mostly unknown.

Audouin's Gull chicks are predated upon at a significant level by introduced predators such as rats and foxes, and dogs and cattle can also destroy nests and kill chicks (Gallo-Orsi, 2003). The Little Tern breeding in Greece is also predated upon by cats and foxes (Goutner 1990) and the Slender-billed Gull, Sandwich and Common Terns in the Ebro Delta are also preyed upon by cats, rats, foxes etc (Oro 2009).

- *Bycatch*

Bycatch of seabirds occurs in a range of fisheries and gear types, although only a few fisheries are regularly monitored by observer programmes (e.g. pelagic longlines in Spain). The extent of artisanal fisheries and gear types across the region is poorly understood, and represents an important gap in knowledge. Records of bycatch of seabirds in the Black Sea are extremely scarce, and initial monitoring of this region should be prioritised.

Trawls

Bottom otter trawls in the Spanish Mediterranean are known to catch Northern Gannet and Gull species, although an annual bycatch rate is not available from the literature (ICES, 2013)

Longlines

Drifting longlines in the western Mediterranean which target swordfish are known to catch significant numbers of yellow-legged Gull (ICES, 2013). No bycatch has been recorded in the Aegean and no information is available for certain parts of the Mediterranean (e.g. the Adriatic).

Demersal longlines are known to catch Audouin's Gull, Mediterranean Gull, Yellow-legged Gull, Black-legged Kittiwake and Great Skua.

Gillnets

Bycatch records for gillnets are patchy within the region. While it has been suggested that the majority of Mediterranean seabird species are less susceptible to being caught in nets (Zydelis *et al*. 2013) , there are records of a number of species being caught, including the Great Cormorant, Seaduck species such as Red-breasted Merganser, and Razorbill (ICES, 2013, Zydelis *et al*. 2013). Further basin-wide research is required on gillnet bycatch to ascertain the current levels of bycatch.

- *Human disturbance*

Due to the pervasive human presence in the Mediterranean, human disturbance to seabirds is likely to be high, both on land and at sea. As described in other eco-regions, light pollution from shipping and coastal developments is likely to affect many of the AEWA listed seabird species. Human intrusions at breeding colonies is also likely, except in the most remote and protected sites (e.g. Sa Conillera in the Balearic Islands).

- *Additional threats*

Renewable energy installations, in the form of offshore wind farms is currently is currently planned for the Mediterranean (e.g. Spain, France, Italy etc.). Oil and gas developments are also likely in the Mediterranean high seas.[100] This is likely to increase disturbance to seabirds at sea through avoidance of wind farms, and attraction to lights at nights. It is also likely to increase the risk of oil spill events, and direct mortality from collision with turbines.

Conservation Action underway:

- ***Marine Important Bird Areas***

See Appendix II for the marine IBAs identified across the species range.

- ***Marine Protected Areas***

The existing Natura 2000 sites with an overlay with marine Important Bird Areas is provided in Annex IV.
The Convention of Biological Diversity's has identified sites as Ecologically and Biologically Significant Areas (EBSAs) within the Mediterranean. These are shown in Appendix IX.

[100] See here: http://www.euromedoffshore.com/

- ***Habitat restoration**:*

Slovenia: Common Tern breeding areas restored under LIFE III Natura[101] and LIVEDRAVA[102] including creation of artificial lakes for nesting birds.

- ***Island restoration***

A number of island eradication projects are currently underway across the Mediterranean region, with a specific focus on seabird conservation.

- Spain, SEO/BirdLife (BirdLife Partner in Spain) rat eradication project in Sa Conillera
- Spain, Sa Cella and La Mola islands, Majorca University of Oxford island rat eradication project in Spanish Mediterranean
- Greece, HOS (BirdLife Greece) LIFE project[103] includes rat eradication project on uninhabited Greek islets and Islands in the Aegean, particularly focused on sites where Audouin's Gull are breeding.
- Italy- rat eradication projects in the Tuscan archipelago under LIFE projects[104] (Montecristo, Giannutri, Gorgona, Capraia, Elba, Giglio e Pianosa)

- ***Bycatch mitigation***
- Seabird Task Force- a collaborative project lead by BirdLife International and SEO/BirdLIFE focused on Artisanal and small scale demersal longline vessels in Catalan coast.

- ***Marine Litter projects***
- MedMaravis marine litter project

- ***Species Action Plans***
- United Nations Environment Programme Mediterranean Action Plan- Regional Activity Centre for Specially Protected Areas (RAC/SPA) Action plan for the conservation of bird species listed in Annex II of the Protocol concerning Specially Protected Areas (SPAs) and biological diversity in the Mediterranean[105]. Species included: Audouin's Gull, Great White Pelican, Lesser Crested Tern, Sandwich Tern, Little Tern
- International Species Action Plan for Audouin's Gull (1996) [106]. Geographic coverage: Algeria, Cyprus, France, Greece, Italy, Lebanon, Mauritania, Morocco, Senegal, Spain, Tunisia and Turkey

- ***Monitoring Programmes**:*
  HOS (BirdLife Greece) carries out annual breeding colony censuses of Audouin's Gull and Mediterranean Gull (Evoikos and Saronikos Gulfs close to Attika)

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 17 outlines the relevant MEAs that are focused on Mediterranean conservation and/or mitigation of key threats to the marine environment.

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[101] skocjanski-zatok.org/en/):
[102] http://livedrava.ptice.si/home/project/actions/?lang=en
[103] LIFE07 NAT/GR/000285 Concrete conservation actions for the Mediterranean Shag and Audouin's Gull in Greece, including the inventory of relevant marine IBAs
http://ornithologiki.gr/page_cn.php?aID=1293&tID=2925
[104] Montecristo 2010: eradication of invasive plant and animal aliens and conservation of species/habitats in the Tuscan Archipelago, Italy
http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3587&docType=pdf
[105] http://www.rac-spa.org/sites/default/files/action_plans/bird.pdf
[106] http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/laurus_audouinii.pdf

Table 17, Main international & regional frameworks & organisations in Mediterranean region focused on relevant threats to AEWA listed seabirds and conservation actions

MEAs/Conventions/Organisations	Countries (contracting parties, member states, partners)	Coastal zone management & planning	Oil spill	Introduced predators	Fisheries Management, fish stocks & bycatch	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
Barcelona Convention, RAC/SPA[107]	Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, the European Union, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey	✓	✓			✓	✓
European Commission Common Fisheries Policy Directives, Policies[108]	All EU countries				✓		
European Commission, Birds Directive[109]	All EU countries			✓	✓	✓	✓
EC, Marine Strategy Framework Directive[110]	All EU countries		✓	✓	✓	✓	
EC, Maritime Spatial Planning Directive[111]	All EU countries						
Fisheries Advisory Councils[112]	All EU countries				✓		
RAMSAR[113]	All EU countries + Bosnia and Herzegovinia, Serbia, Morocco, Algeria, Tunisia, Syrian Arab Rupublic, Libya, Egypt, Turkey, Lebanon, Israel					✓	
CBD- EBSA[114]						✓	
CMS[115]	All countries except Bosnia and Herzegovinia, Turkey, Lebanon		✓		✓		
GFCM[116]	Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, European Union, France, Greece, Israel, Italy, Japan, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Romania, Slovenia, Spain, Syrian Arab Republic, Tunisia, Turkey				✓		
ICES [117]					✓		
IMO Marpol[118]	All countries		✓				
BirdLife International & partners [119]	All countries except Syrian Arab Republic, Libya, Algeria		✓	✓	✓	✓	✓

Explanation of MEA/Convention names and roles

[107] The Barcelona Convention http://www.unepmap.org/index.php?module=content2&catid=001001004 for the protection of the Mediterranean marine environment. The Barcelona Convention focuses on:

- Dumping Protocol (from ships and aircraft)
- Prevention and Emergency Protocol (pollution from ships and emergency situations)
- Land-based Sources and Activities Protocol implemented by RAC/SPA http://www.rac-spa.org/
- Specially Protected Areas and Biological Diversity Protocol
- Offshore Protocol (pollution from exploration and exploitation)
- Hazardous Wastes Protocol
- Protocol on Integrated Coastal Zone Management (ICZM)

[108] The European Union's Common Fisheries Policy (CFP) http://ec.europa.eu/fisheries/cfp/index_en.htm, & Seabird Plan of Action http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437554212028&uri=CELEX:52012DC0665

[109] The Birds Directive, the Natura 2000 network of protected sites, http://ec.europa.eu/environment/nature/natura2000/index_en.htm,

[110] The Marine Strategy Framework Directive (MSFD) http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm,

[111] The Maritime Spatial Plan Directive (MSP) http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm

[112] Mediterranean Advisory Council http://en.med-ac.eu/

[113] The Convention on Wetlands of International Importance, RAMSAR, http://www.ramsar.org/about-the-ramsar-convention

[114] The Convention on Biological Diversity (CBD) https://www.cbd.int/ebsa/ has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the Mediterranean in 2014, identifying a number of sites for seabirds. See here https://www.cbd.int/doc/?meeting=EBSAWS-2014-03 and Appendix IX.

[115] The Convention on Migratory Species (CMS) http://www.cms.int/en/documents/strategic-plan/welcome

[116] Regional Fisheries Management Organisation, General Fisheries Commission for the Mediterranean (GFCM), includes some initial work on seabird bycatch through collaborations with the Barcelona Convention. http://www.fao.org/gfcm/en/

[117] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[118] The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causeshttp://www.imo.org/en/Pages/Default.aspx

[119] BirdLife International Marine Programme, www.birdlife.org,

Knowledge Gaps & Research Needs:

- Mapping of all relevant seabird colonies and collection of tracking information for identification of additional foraging grounds in the Mediterranean (particular focus in the North African sector, and in offshore Eastern Mediterranean).
- Determine scale and impact of bycatch in all fishing gear types across the Mediterranean
- Levels of legal human harvesting in both Europe and North Africa
- Levels of illegal human harvesting in both Europe and North Africa.
- Determine scale and impact of marine litter on seabird species within the region
- Identification of seabird breeding and wintering sites most at risk from habitat degradation and human disturbance, to feed into site management plans.

Conservation action needed:

- Identification of marine IBAs in coastal and offshore areas (particularly in Eastern Mediterranean, Black Sea and North African sector of Mediterranean)
- Designation of IBAs as protected areas (Natura 2000 or under Barcelona Convention)
- Management of existing sites and of new EBSAs, including fisheries management and bycatch monitoring and implementation of bycatch mitigation measures on board vessels fishing in protected areas.

Recommendations for regional action

- Collection of legal hunting data from AEWA Parties as part of AEWA national reporting schedule
- Collection of illegal hunting estimates AEWA Parties as part of AEWA national reporting
- Collection of seabird bycatch records from AEWA Parties as part of AEWA national reporting
- Regional and flyway analysis of legal and illegal harvest and other causes of large scale mortality.

Seabird conservation status, threats and conservation action in the West African Tropical and north-temperate Atlantic

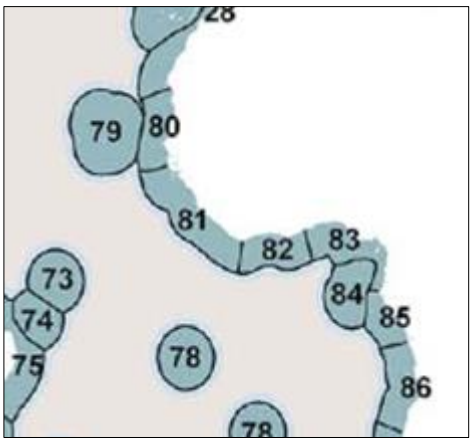

Figure 11, West African Tropical and north-temperate Atlantic region. Adapted from Spalding et al. (2007)

There are thirty AEWA-listed seabirds whose range occurs regularly within the biogeographic region (see Table 18). The populations of eight species are declining, and two species are listed as Near Threatened (Audouin's Gull and Damara Tern). The confidence in populations status and trends is low, and other species may be at greater risk than suggested by the information in Table 18. The table below presents the species in the region, their global conservation status and the period of their life cycle spent in the two eco-regions.

Table 18 Species in region, conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, R= Resident)

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in West African Transition			Period of life cycle in Gulf of Guinea / (*St Helena & Ascension Island where indicated)		
			B	Non-B	R	B	Non-B	R
Laridae	Kelp Gull	LC-↑	-	-		n	y	
	Slender-billed Gull	LC-↑	n	y	y		y Guinea Bissau	
	Grey-headed Gull	LC- Stable	n	y		n	y	
	Audouin's Gull	NT-Stable	n	y		n	y Gabon	
	Black-headed Gull	LC- ↓	n	y		n	y Liberia at southern range	
	Lesser Black-backed Gull	LC-↑	n	y		n	y	
	Black-legged Kittiwake	LC- ↓	n	y		n	y Liberia/Cote d'Ivoire at Southern range	
	Sabine's Gull	LC- Stable	-	-		n	y Angola	
	Damara Tern	NT- Stable	-	-		y Angola	y	
	Sandwich Tern	LC-Stable	n	y		n	y	
	Caspian Tern	LC-↑	y	y	y	y	y	y
	Roseate Terb	LC-Unkwn.	n	y		n	y	
	Lesser crested tern	LC- Stable	n	y		n	y Guinea coast	
	Royal Tern	LC- Stable	y	y	y	y	y	y
	Sooty Tern	LC-Unkwn.	n	y		n	y	
	Bridled Tern	LC_ Unkwn.	y Mauritania	y		y Sao Tome & Principe, Malaba	y	
	Common Gull-billed Tern	LC- ↓	n	y		n	y	
	Brown Noddy	LC- Stable	-	-		y Sao Tome & Principe	y	
	Black Tern	LC- ↓	n	y		n	y	

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in West African Transition			Period of life cycle in Gulf of Guinea / (*St Helena & Ascension Island where indicated)		
			B	Non-B	R	B	Non-B	R
Phaethontidae	White-tailed Tropicbird	LC- ↓	-	-		n	y	
	Red-billed Tropicbird	LC- ↓	n	y		n	y	
Stercorariidae	Great Skua	LC- Stable	n	y		n	y	
Pelecanidae	Great White Pelican	LC- Unkwn.	y Mauritania, Senegal	y		y nigeria-in land	y	
Fregatidae	Great Frigate Bird	LC- ↓	-	-	-	-	y St Helena & Ascension Island	
Scolopacidae	Red Phalarope	LC- ↓	n	y		n	y	
Phalacrocoracidae	Great Cormorant	LC-↑	y Mauritania	y	y Mauritania-Guinea Bissau	?	y	y Angola
Sulidae	Northern Gannet	LC-↑	n	y		n	y southern edge of range-Guinea Bissau	

Key Threat in the West African Tropical and north-temperate Atlantic:

- *Over-fishing in forage fisheries- paucity of information*

Both commercial and artisanal marine fisheries operate in most West African coastal countries. Commercial fisheries operate mainly by longline, trawl and purse seine, with most nations licensing foreign fleets (primarily East Asian and European) to operate within their waters. Domestic fisheries tend to be small-scale or artisanal, with two exceptions: prawn trawling and tuna fisheries. Tuna purse seine and longline fleets operate across the entire region.

Purse seiners in the region are restricted to fishing around the equator in the Atlantic Ocean, whereas pelagic longliners are active everywhere from the shelf edge into pelagic waters. Artisanal fisheries in the region are exceptionally diverse and difficult to characterise, with vessel size, numbers of crew, target species and gear types all highly variable, even within one day's fishing operations.

Indirect impacts of fishing are probably pervasive, but are poorly quantified in the region. Indirect impacts include direct competition between fisheries and seabirds (e.g. overfishing) as well as indirect competition (displacement of seabirds) and loss of commensal species that leads to lower food availability, particularly for tropical seabird species foraging in association with tunas and tuna-like fish.

Most of the assessed fish stocks within the region are considered either fully exploited (43%) or overexploited (53%), with the major fish species in terms of landings, sardine *Sardina pilchardus* not

fully exploited only from Senegal northwards (FAO 2012). This parlous state (53% overexploited) does not mean that negative impacts on seabird from fishing will remain as they are; as fish become scarcer, effort to catch them is likely to increase, which may increase the rates of seabird interactions, further deterioration in fish stocks, etc. More alarming is the impact of overexploitation on low trophic level species such as sardines, with indirect impacts on seabirds through competition (e.g. Cury *et al*. 2011) and potentially more problematic, ecosystem-wide changes to trophic dynamics, with the potential for the permanent loss of commercially important species being a real possibility (e.g. Crawford 1998).

Within the African Transition Zone (e.g. Mauritania and Senegal) Northern Gannets feed on sardines and other pelagic fish, with the potential for increased competition with commercial fisheries as stocks are exploited (Gremillet *et al*. 2015)

- *Bycatch*

Longlines

As described above this region currently supports intensive industrial and commercial fisheries, as well as artisanal fisheries. Pelagic and demersal longlines operate throughout the region, as do trawls, each presenting a bycatch threat to seabirds. Although seabird bycatch is poorly quantified within the region, the Northern Gannet is the only AEWA-listed seabird species that is likely to be at significant risk. Both gannet species (Cape Gannet in southern Africa and Northern Gannet in West Africa) are known to be killed in demersal longlines (Watkins *et al*. 2008, Maree *et al*. 2014, Camphuysen *in litt*). In addition, species caught by longliners elsewhere in their range may be vulnerable in the West African Tropical Atlantic region as well. Audouin's Gull, Black-headed Gull, Yellow-legged Gull and Mediterranean Gull, Sandwich Tern and Black Tern have all been reported killed in low numbers by longline fisheries in the Mediterranean, and their susceptibility to longlining off West Africa merits closer investigation (Cooper *et al*. 2003, Valeiras & Camiñas 2003). These fatalities seem likely to be isolated occurrences and such mortality is not expected to be a conservation problem for these or any other tern species within the biogeographic region.

Gillnets

Artisanal fishing, particularly using gillnets, is believed to be widespread in the region, probably accounts for a significant proportion of total fish catches, and potentially impacts a very wide range of species. However there are virtually no gillnet catch or effort data available from the region, l*et al*one data on seabird catch rates. Pursuit-foragers are the most vulnerable to being captured in gillnets, which suggests that only the Great Cormorant is potentially at risk from direct mortality from gillnet fishing in the region.

Trawling

The direct effects of trawling on seabirds have only been recognized as a serious conservation issue relatively recently (e.g. Croxall 2008). However, our understanding of risks to seabirds from trawl fishing comes from outside this region; there are no data on seabird interactions with trawl fisheries in West Africa north of Namibia. Recent studies in the southern hemisphere (e.g. Sullivan *et al*. 2006, Watkins *et al*. 2008) have confirmed that large numbers of mainly Procellariiform birds can be killed or seriously injured by fishing gear from this industry. There are three ways that seabird fatalities can occur due to trawl fishing: net captures (diving birds swimming into the path of the open trawl net and being drowned), net entanglements (birds becoming entangled with the net) and cable strikes. Fatal interactions with cables are difficult to detect unless active seabird monitoring is taking place behind trawlers but occur relatively infrequently (Watkins *et al*. 2008). However, due to the scale of fishing effort of many trawl fisheries, these infrequent interactions can multiply up to very substantial total mortalities (Maree *et al*. 2014).

Strikes against the net sonde (also known as third wire or sensor cable) were identified in the early 1990s (Bartle 1991), leading to the banning of the use of net sonde cables in several fisheries (e.g. CCAMLR 1998). Recent reports from South Africa indicate that side trawlers (vessels the bring the net up on the side of the vessel instead of the stern) may be a significant threat to Cape Gannets

during certain conditions, as the net remains on the surface for longer periods of time (B. Rose pers. comm.).

Species that forage in association with trawlers in this region, and which might be at risk from fatal interactions, include the Northern Gannet, Royal Tern and Long-tailed Skua.

- *Invasive predators*

The world over, wherever seabirds breed on islands they are highly vulnerable to introduced predators. Most of the vulnerable, AEWA-listed seabirds from the islands of Cape Verde have disappeared, or largely disappeared, from unprotected/inhabited islands; healthy populations remain only at uninhabited islands where access by people is difficult or controlled. Elsewhere in the region there are no significant invasive species issues still affecting seabirds, as most islands relatively close to the continent have long been colonised by people and/or commensal species. Within the Gulf of Guinea, the only significant, extant seabird colony is at the Tinhosas islands, off Principe (Valle *et al*. 2014). Currently these islands are free of invasive predators, but access to the islands is uncontrolled and frequent, which presents a very significant risk of colonisation by stowaway rats or mice.

- *Human disturbance*

Human disturbance, including uncontrolled tourist/visitor access to colonies and roosting sites and coastal developments, continue to pose a threat. Of particular concern is uncontrolled access. Many countries have strong and appropriate legislation and designated protected areas, but have little or no capacity to enforce the legislation or control access to breeding and roosting sites within national parks – this is an overt threat at the Tinhosas islands (Valle *et al* 2014).

Bulk marine sediment mining (particularly for marine phosphate deposits) and the exploitation of oil and gas deposits in the region have very significant risks to entire ecosystems. These are incipient threats that are more advanced elsewhere in the world, but could become very significant sources of disturbance in the next 5-10 years.

- *Harvesting*

Unregulated harvesting of seabirds within the region is currently considered a moderate threat for several species. In most countries it is technically illegal to harvest seabirds, although there is little enforcement or control of this. There is little evidence that harvesting is occurring at significant rate at seabird colony sites which are reasonably well-studied. It is possible that the low densities of both humans and seabirds along the coast, the relative expense for people to access the breeding sites and other logistical constraints has reduced the likelihood of large scale seabird harvesting. However this is a significant knowledge gap, and the capacity for authorities to limit or prevent the harvesting of eggs, chicks or fledged/adult birds is currently negligible. Harvesting of adult and juvenile birds captured either intentionally or unintentionally whilst out at sea or at roosting sites, is a different but equally worrying threat. There is evidence of deliberate setting of float-lines for seabirds in Angola (J. Cooper *pers comm*) and of the preparation of seabird carcasses for human consumption from bycatch in a longline operation in Mauritania (Camphuysen *in litt*), as well as sporadic but anecdotal accounts of terns and gulls being targeted by humans throughout the region. The prevalence, regularity and impacts of deliberate targeting of adult birds for human consumption remain unknown and is potentially the biggest threat to many of the region's more coastal species listed by AEWA.

- *Climate change*

Sea-level rise and changes to ocean/coastal sea current patterns, and the erosion-deposition regimes, could cause significant loss of island habitats in coming years – especially the islands and breeding sites within the Banc d' Arguin, (Mauritania), Saloum Delta (Senegal) and Bijagos archipelago (Guinea Bissau). Other threats include altered food availability for seabirds from changed sea-surface

temperature and ocean productivity patterns, loss of upwelling (particularly concerning for Senegal and Mauritania), and heat stress during breeding.

It is also possible that other seabird species' ranges will change, and bring them into areas where they could compete with or otherwise disturb present-day assemblages.

Conservation Action underway:

- ***Marine Important Bird Areas**:*

Existing marine Important Bird Areas for each of the AEWA species are shown in Appendix II.

Current work to identify marine IBAs:
BirdLife International is implementing a regional initiative 'Alcyon Project[120]' to identify marine Important Bird and Biodiversity Areas in the temperate West African region. This is geared to provide scientific assessments of new data sources from tracking studies and ship-based atlassing, so as to delimit key marine areas for seabirds in the region. This will then include the provision of the IBAs to national and regional marine spatial planning processes. This will include Marine Protected Area directorates within each country, the Abidjan Convention and the Convention on Biological Diversity's 'Ecologically or Biologically Significant Areas' (EBSA) process.

These IBAs will also be used to help marine extractive industries (mining, fishing, etc.) to plan accordingly for infrastructure development or other activities that may be risky to seabirds.

- **Marine Protected Areas**

The existing protected areas are identified in Appendix V, with an overlay of marine Important Bird Areas.

The Convention on Biological Diversity has identified sites as Ecologically and Biologically Significant Areas (EBSAs). These are shown in Appendix X.

- ***Action Plans***

International (East Atlantic) Action Plan Roseate Tern Sterna dougallii [121]

- ***Seabird bycatch mitigation**:*

BirdLife International's Alcyon project is also initiating work into seabird bycatch within the region, but this is currently at a very preliminary stage.

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 19 outlines the relevant MEAs that are focused on West African Tropical and north-temperate Atlantic conservation and/or mitigation of key threats to the marine environment.

[120] The Alycon Project http://www.birdlife.org/africa/projects/alcyon-project-protecting-seabirds-identifying-marine-ibas-west-africa

[121]http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/sterna_dougalii.pdf

MEAs/Conventions & Organisations	Countries (contracting parties, partners)	Fisheries Management, fish stocks & bycatch	Introduced predators	Marine Planning	Harvesting	Climate change	Oil spill	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
Abijan Convention[122]	All countries in region except Angola, Cape Verde, Equitorial Guinea, Namibia, Sao Tome e Principe						✓	✓	✓
RAMSAR[123]	Morocco, Mauritania, Senegal,Guinea-Bissau,Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Dem R Congo, Angola							✓	
CBD- EBSA[124]	All countries in regio							✓	
CMS[125]	Morocco, Mauritania, Senegal,Guinea-Bissau,Guinea, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Dem R Congo, Angola						✓		
CECAF[126]	High Seas & Territorial waters. Angola, Benin, Cameroon, Cabo Verde, Dem. Rep. of the Congo, Congo, Côte d'Ivoire, Cuba, Equatorial Guinea, European Union, France, Gabon, Gambia, Ghana, Greece, Guinea, Guinea-Bissau, Italy, Japan, Republic of Korea, Liberia, Mauritania, Morocco, Netherlands, Nigeria, Norway, Poland, Romania, Sao Tome and Principe, Senegal, Sierra Leone, Spain, Togo, United States of America.	✓							
SEAFO[123]	High Seas, Angola, Namibia, South Africa	✓							
ICCAT[123]	50 contracting parties, including South Africa, Namibia, Angola	✓							
ICES [127]		✓							
Marpol Convention[128]							✓		

BirdLife International & partners [129]	Cameroon, Ivory Coast, Ghana, Liberia, Morocco,Nigeria, Sierra Leone	✓	✓				✓	✓	✓

Table 19, Main international & regional frameworks & organisations in West African Tropical and north-temperate Atlantic region focused on relevant threats to AEWA listed seabirds and conservation actions

Explanation of MEA/Convention names and roles

[119] Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (The Abijan Convention), covers a marine area from Mauritania to South Africa http://abidjanconvention.org/ The Convention provides an overarching legal framework for all marine-related programmes in West, Central and Southern Africa.Under its articles, the Convention lists the sources of pollution that require control as: ships, dumping, land-based activities, exploration and exploitation of the seabed, and atmospheric pollution. It also identifies environmental management issues from which cooperative efforts are meadows, wetlands, barriers and lagoons.

[120] The Convention on Wetlands of International Importance, RAMSAR, http://www.ramsar.org/about-the-ramsar-convention

[121] The Convention on Biological Diversity (CBD) has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the South-Eastern Atlantic https://www.cbd.int/ebsa/ & https://www.cbd.int/doc/?meeting=EBSA-SEA-01

[122] The Convention on Migratory Species (CMS) http://www.cms.int/en/documents/strategic-plan/welcome

[123] Regional Fisheries Management Organisation,
Fishery Committee for the Eastern Central Atlantic (CECAF) , http://www.fao.org/fishery/rfb/cecaf/en
The South East Atlantic Fisheries Organisation (SEAFO) http://www.seafo.org/ ,
The International Commission for the Conservation of Atlantic Tunas https://www.iccat.int/en/

[124] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[125] The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causeshttp://www.imo.org/en/Pages/Default.aspx

[126] BirdLife International Marine Programme, www.birdlife.org,

Knowledge Gaps & Research Needs

- Targeted capture of seabirds at sea or at mainland roosts (as distinct from at breeding sites) is a known threat but of unknown consequences. This is probably the biggest knowledge gap for direct threats that requires filling
- The scale of bycatch in longline and trawl fisheries is of concern in the region for Northern Gannets, and possibly a few other species, and this should be addressed, especially in Senegal and Mauritania.
- As a whole, the heavy and increasing exploitation of forage fish by industrial, commercial and artisanal fisheries, is a source of significant concern. Forage fish are critical components of marine ecosystems, and their loss through overfishing could have permanent and catastrophic effects on the entire region, including most of the seabird species.
- The threat of marine oil and gas extraction, and of bulk marine sediment mining are looming threats that could have both short-term and long-term consequences for seabirds and ecosystems.
- On board surveys of seabird bycatch in artisanal and commercial vessels, in all gear types
- Impact and scale of capture of seabirds at sea and at roosting sites
- Impact of forage fishery on seabirds

Conservation action needed:

- Identification of important sites for seabirds (marine IBAs) and protection under existing marine protected area frameworkds
- Best practice for bycatch mitigation implemented in fishing fleets where available.
- Determine extent of gillnet bycatch and develop bycatch mitigation
- Manage forage fisheries to ensure sustainable catch and sufficient prey for seabirds

Seabird conservation status, threats and conservation action in Temperate Southern Africa

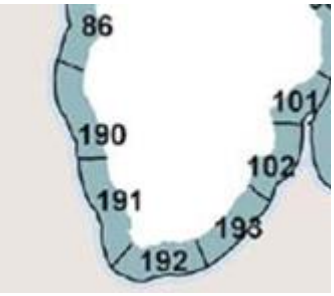

Figure 12, Temperate southern Africa region. Adapted from Spalding *et al*. (2007)

There are 26 seabird species which regularly occur in this region, including endemic species such as the Cape Gannet and the Cape Cormorant. Three species are listed as Endangered at the global level, and one species is currently considered 'vulnerable'. The species within the region are listed in Table 20.

Table 20 Species in region, conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, Res= Resident)

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in Benguela			Period of life cycle in Agulhas		
			B	Non-B	Res	B	Non-B	Res
Laridae	Kelp Gull	LC-↑			y			y
	Hartlaub's Gull	LC-↑	y	y	y	y	y	y
	Grey-headed Gull	LC- Stable	y	y		y	y	
	Lesser Black-backed Gull	LC-↑	-	-	-	n	y	
	Sabine's Gull	LC-Stable	n	y		n	y	
	Damara Tern	LC- Stable	Y	y	y	y	y	y
	Sandwich Tern	LC-Stable	n	y		n	y	
	Antarctic Tern	LC-Unkwn.	n	y		n	y	
	Arctic Tern	LC- ↓	n	y		n	y	
	Little Tern	LC-↓	n	y		n	y	
	Caspian Tern	LC-↑	y	y	y	y	y	y
	Roseate Tern	LC-Unkwn.	y	y	y	y	y	y
	Greater Crested Tern	LC-Stable	y	y	y	y	y	y
	Bridled Tern	LC-Unkwn.	n	n		y	y	
	Black Tern	LC-↓	n	y		-	-	
Spheniscidae	African Penguin	EN- ↓	y	y		y	y	
Stercorariidae	Long-tailed Skua	LC-Stable		y			y	
Pelecanidae	Great White Pelican	LC-Unkwn.	y	y			y	
Scolopacidae	Red-necked Phalarope		n	y				

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in Benguela			Period of life cycle in Agulhas		
			B	Non-B	Res	B	Non-B	Res
Podicipedidae	Black-necked Grebe	LC- Unkwn.	y	y	y	y	y	y
	Great Crested Grebe		y	y	y	y	y	y
Phalacrocoracidae	Great Cormorant	LC-↑	y	y	y	y	y	y
	Cape Cormorant	EN- ↓	y	y	y	y	y	y
	Bank Cormorant	EN- ↓	y	y	y	y	y	y
	Crowned Cormorant	NT- Stable	y	y	y			
Sulidae	Cape Gannet	VU- ↓	y	y		y	y	

Key Threats in Temperate Southern Africa

- *Prey depletion/over-fishing*

The Benguela upwelling system on the Atlantic and southern Indian ocean coasts of southern Africa supports several large commercial fisheries (Crawford, 2007), and both South Africa and Namibia produce and export large quantities of fish products (Petersen *et al*. 2007). Fisheries include a large purse-seine fishery for European Anchovy (*Engraulis encrasicolus)* and sardines, the South American Pilchard (*Sardinops sagax),* a large demersal trawl fishery directed at two species of hake (*Merluccius* spp.) and a mid-water trawl for Maasbanker *Trachurus trachurus* (mainly in Namibian waters), a demersal longline fishery also directed at hake and other species, and a relatively small pelagic longline fishery directed at tuna, swordfish and sharks (in both Namibian and South African waters).

Very little artisanal fishing occurs on the sparsely populated Atlantic coasts of Namibia and South Africa, although a certain level does occur in southern Angolan waters (Roux *et al*. 2007). On the Indian Ocean coast of South Africa similar fisheries to the Benguela system occur on the Agulhas Bank. North of this, marine fisheries are much smaller and more artisanal, but commercial operations include lobster traps, trawling for prawns and squid jigging.

Of significant concern to the conservation of seabirds in the region is the collapse of the Namibian sardine fishery (Ludynia *et al*. 2010) and the eastward shift in distribution of sardine and anchovy stocks- important seabird prey in South Africa (Coetzee *et al*. 2008).

The breeding season places high energy demands on adult seabirds, with breeders restricted to a smaller foraging range and requing access to their preferred prey for chick provisioning. The lack of easily available prey is the main reason behind the poor breeding success recorded by forage fish dependent seabirds in recent decades (Pichegru *et al*. 2007; Crawford *et al*. 2008). The lack of prey is related to two main factors: overfishing and large-scale periodic environmental changes in the ecosystem, such as El Niño.

The consequences of this prey depletion for seabirds within the region are dire, with the status of three seabird species which depend primarily on small pelagic fish stocks (African Penguin, Cape Cormorant and Cape Gannet) deteriorating most strongly in the western part of their distribution. Populations have declined to the point where the African Penguin and Cape Cormorant have been listed as Endangered. (e.g. Crawford & Dyer 1995, Crawford 2003, 2007, Crawford *et al*. 2008). In Namibia, overfishing of the sardine resource led to collapses in the national populations for those three seabird species (Kemper

2007). For a more detailed description see the AEWA Multi-species Action Plan for Benguela Upwelling System Coastal Seabirds (2015).

- *Oil spills*

Many of the seabird species listed above are vulnerable to oil spills, and chronic oil pollution, particularly the cormorant species, African Penguin and Cape Gannet which spend large amounts of time on the water surface. South Africa is a global hotspot for oil pollution (Wolfaardt *et al*. 2009). Oil pollution causes feathers to clump, leading to a breakdown in their insulative properties. As a result birds become hypothermic and are forced to leave the sea. Birds then dehydrate, mobilize stored energy reserves and may lose up to 13% of their body mass within a week and unless rescued will starve to death (Underhill *et al*. 1999; Wolfaardt *et al*. 2009).

- *Predation by native species*

Predation by Cape Fur Seals, Kelp Gulls and Great White Pelicans is a considerable threat for several species in the region. The Cape fur seal has been recorded preying on Cape Gannet (du Toit *et al*. 2004; David *et al*. 2003), Cape Cormorant (Marks *et al*. 1997), Crowned and Bank Cormorants (du Toit *et al*. 2004) and the African Penguin (Shaugnessy 1978; Crawford *et al*. 2001; du Toit *et al*. 2004). This predation is thought to be a learned play behaviour in sub-adult males rather than a common behaviour in seals (du Toit *et al*. 2004). Despite this, predation by Cape fur seals can have significant impacts on seabird populations, with up to 83% of Cape Gannet fledglings killed in some years (Makhado *et al*. 2006).

Kelp Gulls are known predators of the young chicks and eggs of the African Penguin (van Heezik & Seddon, 1990; du Toit *et al*. 2003), Bank Cormorant (du Toit *et al*. 2003), Cape Cormorant (Voorbergen *et al*. 2012), and Crowned Cormorant (du Toit *et al*. 2003). Human disturbance greatly facilitates Kelp Gull predation, particularly on the cormorants (Voorbergen *et al*. 2012) as they are more prone to leave their nests when disturbed. On islands from which guano has been removed, predation on African Penguin chicks and eggs has increased due to a lack of burrowing substrate (Hockey & Hallinan 1981, van Heezik & Seddon 1990).

Great White Pelican predation is confined mainly to the islands off the west coast of South Africa, where it affects mainly the chicks of Cape, Bank and Crowned Cormorants and Cape Gannets (de Ponte Machado, 2007). In some years, predation by pelicans caused an almost complete breeding failure of the three cormorant species at Dassen Island (Mwema, 2010).

- *Bycatch*

As described above, intensive commercial fisheries operate across the region, and include demersal and pelagic longlines, trawl and purse seines and some gillnetting (small scale/artisanal). In relation to susceptibility of AEWA listed seabirds to longline bycatch, the Cape Gannet is known to be killed in demersal longlines (Watkins *et al*. 2008, Maree *et al*. 2014). Cape Gannets are also recorded as bycatch in pelagic longline fishing off South Africa (Albatross Task Force, unpublished data).

In relation to trawl vessels, recent reports from South Africa indicate that side trawlers (vessels that bring the net up on the side of the vessel instead of the stern) may be a significant threat to Cape Gannets (*Morus capensis)* during certain conditions, as the net remains on the surface for longer periods of time (B. Rose pers. comm. in Hagen & Wanless 2015).

Little gillnetting takes place within the Benguela away from small-scale commercial and artisanal fishing within shallow bays and estuaries. Low levels of fishing effort, including illegal nets (75 – 180

mm mesh) in South Africa, probably kill low numbers of seabirds that forage close to the shore but at a level which is not currently considered a significant threat to AEWA-listed seabirds (S. Lamberth, *in litt.*). All cormorants are potentially at risk from gillnets (Žydelis *et al*. 2013), as is the African Penguin. There is a strong likelihood that diving seabirds are captured in gillnets throughout the region, but there are effectively no data available and this must be considered a significant data gap and a high priority for action.

- *Human disturbance*

All seabirds are vulnerable to human disturbance, especially during breeding but Bank, Cape and Crowned cormorants and Damara Tern are particularly sensitive. Human visitors during breeding can cause abandonment of nests resulting in egg and chick loss to predators or heat or cold stress. Coastal development projects also affect these species in a more lasting manner due to the loss of habitat.

- *Climate change:*

The Benguela Current Large Marine Ecosystem (BCLME) is a highly variable system, but sustained environmental changes such as Benguela Niños, Agulhas intrusions and changes in winds have the potential to impact the ecosystem in unpredictable ways (Timmerman *et al*. 1999; Shannon & Toole, 2003). The effects of global climate change are also likely to be felt through unpredictable changes to weather and sea conditions. Sea level rise was identified as a threat which will affect those seabirds which breed on low-lying islands (African Penguin, Cape Gannet, and Cape, Bank and Crowned cormorants).

- *Mining and oil and gas exploitation*

Both onshore and offshore mining have the potential to threaten seabirds in the region. The Damara Tern is most at risk from shore-based mining activities. Offshore phosphate mining, and oil and gas drilling are not yet established in the region so the threats are unknown but these activities could potentially have significant impacts on the entire ecosystem.

- *Harvesting*

There are relatively low levels of egg collection and harvesting of Cape Gannet, and Damara Tern.

Conservation Action:

- **Marine Important Bird Areas**

In South Africa, 30 marine IBAs have been identified for 18 of the AEWA seabird species occurring in the region: Africa Penguin, Little Grebe, Great Crested Grebe, Black-necked Grebe, Cape Gannet, Bank Cormorant, Cape Cormorant, Crowned Cormorant, Antarctic Tern, Caspian Tern, Greater Crested Tern, Sandwich Tern, Roseate Tern, Common Tern, Damara Tern, Kelp Gull, Grey-headed Gull and Hartlaub's Gull.

In Namibia, 17 marine IBAs have been identified for 14 of the AEWA listed seabirds occurring in the region: African Penguin, Cape Gannet, Crowned Cormorant, Cape Cormorant, Bank Cormorant, Great White Pelican, Caspian Tern, Common Tern, Damara Tern, Greater Crested Tern, Sandwich Tern, Kelp Gull, Hartlaub's Gull, Black-necked Grebe. See Appendix II for an overview of marine Important Bird Areas identified for each of the AEWA species across their range.

- ***Marine Protected Areas***

In South Africa and Namibia, many seabird breeding sites are legally protected, either as national parks or by the Ramsar Convention. Appendix VI shows an overview of the existing protected area network overlaid by marine Important Bird Areas.

The Convention on Biological Diversity has identified sites within the region as Ecologically and Biologically Significant Areas. These sites are shown in Appendix X and XI.

- ***Species Action Plans***

AEWA is developing a multi-species action plan for the Benguela ecosystem (covering Angola, Namibia and South Africa). The plan covers nine seabird species and lays out a framework for conservation action.

- ***Seabird monitoring***

In Namibia and South Africa, regular monitoring takes place a many seabird breeding colonies. In Namibia, three seabird breeding islands are permanently staffed (Mercury, Ichaboe, Possession Islands) and these sites have regular counts (**Error! Reference source not found.**) while other sites are counted on an ad hoc basis.

Monitoring programmes for the Namibian Islands Marine Protected Area (NIMPA) is being developed and a draft management plan for these islands is also nearing completion. South African authorities conduct annual censuses of 12 seabirds, including African Penguin, Cape Gannet, Swift Tern, and Cape, Crowned and Bank cormorants. Opportunistic information on the Damara and Caspian terns is collected. All major seabird breeding sites (15) are surveyed annually, with some sites being visited monthly. These surveys are organized by Department of Environmental Affairs, CapeNature, South African National Parks, Ezemvelo KZN Wildlife.[130] Many of the breeding sites have management plans in place.

- ***Fisheries management***

Some conservation measures that have been introduced benefit several seabird species. In South Africa efforts to introduce spatial management (e.g. setting quotas based on fish distribution) into the sardine fishery, using African Penguins as a flagship species, will also benefit other seabirds that depend on sardine (e.g. Cape Gannets and Cape Cormorants).

- ***Predator management***

Selective culling of individual problem seals at various colonies in South Africa and Namibia will benefit the seabirds.

- ***Coastal management/protection***

The use of offroad vehicles has been banned on South African beaches, to the benefit of several tern species that breed on beaches.

- ***Bycatch mitigation***

[130] Government body responsible for wildlife conservation in the KwaZulu-Natal Province, see http://www.kznwildlife.com/

The Albatross Task Force (ATF) works with fishing companies to reduce accidental bycatch and mortality of seabirds in the trawl and longline fisheries. While their work is focussed mainly on albatrosses and petrels, measures such as bird scaring lines also benefit Cape Gannets, which can be accidentally killed in trawl fisheries (Maree *et al*. 2014).

- ***Additional conservation action***

Species-specific conservation measures that are underway for each species are listed in Annex 2 of the multi-species action plan.

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 21 outlines the relevant MEAs that are focused on southern African marine biodiversity conservation and/or mitigation of key threats to the marine environment.

Table 21 Main international & regional frameworks & organisations in temperate southern Africa region focused on relevant threats to AEWA listed seabirds and conservation actions

s/Convention/Organisation	Countries (contracting parties/ party to organisation)	Fisheries Management, fish stocks & bycatch	Introduced predators	Marine Planning	Harvesting	Climate change	Oil spill	Mining (oil and gas & deep sea)	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
Abijan Convention[131]	All countries in region except Angola, Cape Verde, Equitorial Guinea, Namibia, Sao Tome e Principe						✓		✓	✓
RAMSAR[132]	Namibia, South Africa								✓	
CBD- EBSA[133]	All countries in region								✓	
CMS[134]	All countries in region except Namibia			✓		✓	✓			
RFMO- CECAF[135]	High Seas & Territorial waters. Angola, Benin, Cameroon, Cabo Verde, Dem. Rep. of the Congo, Congo, Côte d'Ivoire, Cuba, Equatorial Guinea, European Union, France, Gabon, Gambia, Ghana, Greece, Guinea, Guinea-Bissau, Italy, Japan, Republic of Korea, Liberia, Mauritania, Morocco, Netherlands, Nigeria, Norway, Poland, Romania, Sao Tome and Principe, Senegal, Sierra Leone, Spain, Togo, United States of America.	✓								
RFMO- SEAFO[132]	High Seas, Angola, Namibia, South Africa	✓								

RFMO- ICCAT[132]	50 contracting parties, including South Africa, Namibia, Angola	✓								
RFMO-IOTC[132]										
ICES [136]		✓								
IMO Marpol[137]	All countries in region						✓			
BirdLife International & partners [138]	South Africa	✓	✓				✓		✓	✓

Explanation of MEA/Convention names and roles

[131] The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (The Abijan Convention), it covers a marine area from Mauritania to South Africa http://abidjanconvention.org/

[132]The Convention on Wetlands of International Importance, RAMSAR, http://www.ramsar.org/about-the-ramsar-convention

[133] The Convention on Biological Diversity (CBD) has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the North East Atlantic https://www.cbd.int/ebsa/

[134] The Convention on Migratory Species (CMS) http://www.cms.int/en/documents/strategic-plan/welcome

[135] Regional Fisheries Management Organisation:

- Fishery Committee for the Eastern Central Atlantic (CECAF) , http://www.fao.org/fishery/rfb/cecaf/en

The purpose of the Committee is to promote the sustainable utilization of the living marine resources within its area of competence by the proper management and development of the fisheries and fishing operations

- The South East Atlantic Fisheries Organisation (SEAFO) http://www.seafo.org/ , SEAFO is a regional fisheries management organisation in South East Atlantic Ocean established in line with the provisions of the United Nations Law of the Sea (Article 118) and United Nations Fish Stocks Agreement (UNFSA). The Convention Area excludes exclusive economic zones of the coastal states in the region.

- The International Commission for the Conservation of Atlantic Tunas https://www.iccat.int/en/ ,

- Indian Ocean Tuna Commission (IOTC) http://www.iotc.org/ has a remit which extends from South Africa into Indian Ocean. South Africa is not a contracting party.

[136] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[137] The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causeshttp://www.imo.org/en/Pages/Default.aspx

[138] BirdLife International Marine Programme, www.birdlife.org,

Knowledge gaps & Research needs

- Seabird bycatch in gillnets and gillnet fishing effort.
- Impacts of climate change on seabird populations and prey dynamics.
- Impacts of mineral extraction (phosphate mining etc) on marine ecosystem and seabirds
- A better understanding of seabird (especially African Penguin and cormorants) mortalities in gillnets is required.
- Sustainable catch levels for forage fisheries (1/3 for the birds)

Conservation Action Needed:

- Several species would benefit from protection of prey availability around key breeding colonies. Species that may benefit include African Penguins and Cape Cormorants (sardine and anchovy) and Bank Cormorants (rock lobster).
- Suitable nesting habitat should be provided at colonies where this is limiting for the African Penguin and, Crowned and Bank cormorants)
- Both Namibia and South Africa should implement oil spill contingency plans for key breeding islands, in case of further catastrophic oiling events.
- Where guano harvesting still occurs on Namibian islands, this should be prohibited.
- Seabird breeding sites on the mainland require better protection, especially Damara Terns.

Seabird conservation status, threats and conservation action in East Africa (Western Indo-Pacific)

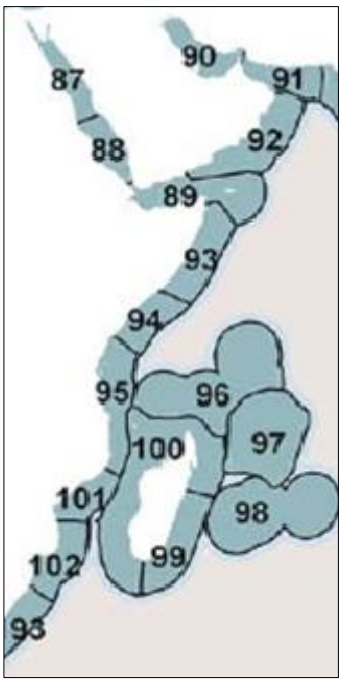

Figure 13 East Africa focal region. Adapted from Spalding *et al*. (2007)

There are three main marine eco-regions within the East Africa/Western Indo-Pacific biogeographic region.

- The Western Indian Ocean eco-region is here considered to include the coastal countries of Kenya, Tanzania and northern Mozambique, and the island nations of Comoros, Madagascar, Mauritius, Reunion (France) and Seychelles. This region, particularly the islands in the Mascarene Archipelago, the Mozambique Channel and the Seychelles supports large numbers of breeding seabirds, such as the Tropicbirds, Frigatebirds and Masked Booby (Le Corre *et al*. 2012).
- The Somali/Arabian ecoregion includes the Central Somali coast, and the Arabian Gulf.
- The Red Sea and Gulf of Aden includes both named regions.

There are 36 seabird species which regularly occur within the region (see table 22) Endemic species to the broader Eastern African biogeographic region includes the Sooty Gull, Swift Tern, White-cheeked Tern and Socotra Cormorant. Within the Red Sea/Gulf of Aden ecoregion there is the endemic White-eyed Gull and endemic subspecies of the Red-billed Tropicbird and Brown Noddy. The range of the Endangered Cape Cormorant and African Penguin extend into the southern part of the Western Indian Ocean (Mozambique). The wintering range of the Vulnerable Cape Gannet extends along the Western Indian Ocean eco-region, along the coasts of Mozambique to Kenya. In total four species within the biogeographic region are listed as threatened, and one (the White-eyed Gull) is listed as Near-Threatened. The global population of 18 species are declining.

Table 22 Species in region, conservation status & life-history usage of region. (B= Breeding, non-B= non-breeding, R= Resident)

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in Western Indian Ocean			Period of life-cycle in Somali/Arabian			Period of life-cycle in Red Sea & Gulf of Aden		
			B	Non-B	Res	B	Non-B	Res	B	Non-B	Res
Anatidae	Red-breasted Merganser	LC- Stable	-	-	-	n	y (Arabian)		-	-	-
Fregatidae	Great Frigatebird	LC-↓	n	y		-	-	-	-	-	-
Fregatidae	Lesser Frigatebird	LC- ↓	n	y		-	-	-	-	-	-
Laridae	Brown Noddy	LC-Stable	y	y	y	y	y	y	y	y	y
Laridae	Lesser Noddy	LC- Stable	y	y		n	y			y	
Laridae	Common Gull-billed Tern	LC- ↓	n	y		y	y		n	y	
Laridae	Bridled Tern	LC- Unkwn.	y	y		y	n		y	n	
Laridae	Sooty Tern	LC- Unkwn.	n	y		n	y		n	y	
Laridae	White-cheeked Tern	LC-↓	-	-		y	y	y	y	y	y
Laridae	Greater Crested Tern	LC- Stable	y	y	y	y	y	y	y	y	y
Laridae	Lesser Crested Tern	LC-Stable	n	y	n	y	y	n	y	y	y
Laridae	Saunder's Tern	LC- ↓	n	y	n	y	y	y	y	y	y
Laridae	Roseate Tern	LC- Unkwn.	y	y	y	n	n	n	y	n	n
Laridae	Caspian Tern	LC-↑	n	y	y	n	n	n	y	y	y
Laridae	Little Tern	LC- ↓	n	y	n	y	y	y	y	y	n
Laridae	Sandwich Tern	LC- Stable	n	y	n	n	y	n	n	y	n
	Common Tern	LC- ↓	n	y	n	n	y	n	y	y	n
Laridae	Lesser Black-backed Gull	LC-↑	n	y	n	n	y	n	n	y	n
Laridae	Black-headed Gull	LC- ↓	n	y	n	n	y	n	n	y	n
Laridae	Caspian Gull	LC- Stable	n	n	n	n	y	n	n	y	n

Family	Species	Global Population trend & Global Red List Status	Period of life-cycle in Western Indian Ocean			Period of life-cycle in Somali/Arabian			Period of life-cycle in Red Sea & Gulf of Aden		
			B	Non-B	Res	B	Non-B	Res	B	Non-B	Res
Laridae	Grey-headed Gull	LC- Stable	y	y	n	n	y	n	n	n	n
Laridae	Slender-billed Gull	LC-↑	n	n	n	n	y	n	y	y	y
Laridae	Sooty Gull	LC- ↓	y	y	y	y	y	y	y	y	y
Laridae	Pallas' Gull	LC- ↓	n	n	n	n	y	n	n	y	n
Laridae	White-eyed Gull	NT- Stable	n	n	n	y	y	y	y	y	y
Pelecanidae	Great White Pelican	LC- Unkwn.	y	y		-	-	-	n	y	
Phaethontidae	Red-billed Tropicbird	LC- ↓	n	y		n	y		n	y	
Phaethontidae	White-tailed Tropicbird	LC-↓	n	y		n	y		-	-	-
Phaethontidae	Red-tailed Tropicbird	LC- Stable	n	y		n	y		-	-	-
Phalacrocoracidae	Great Cormorant	LC-↑	y	y	y	y	y	y	y	y	y
Phalacrocoracidae	Socotra Cormorant	VU- ↓	-	-	-	y	y	y	y	y	y
Phalacrocoracidae	Cape Cormorant	EN- ↓	n	y	n	-	-	-	-	-	-
Podicipedidae	Great Crested Grebe	LC- Unkwn.	y	y	y	y	y	y	y	y	y
Scolopacidae	Red-necked Phalarope	LC-↓	-	-	-	n	y		-	-	-
Spheniscidae	African Penguin	EN- ↓	n	y		-	-	-	-	-	-
Sulidae	Masked Booby	LC- ↓	y	y	y	y	y	y	y	y	y
Sulidae	Cape Gannet	VU- ↓		y		-	-	-	-	-	-

Key Threats in East Africa (Western Indo-Pacific)

- *Changes in prey availability- over-fishing*

Along the East African coast, reductions in seabird prey are likely to be caused by changes in foraging associations. The high seas area (particularly around the Seychelles Basin and the Somalia Current) support large scale industrial and commercial tuna fisheries, both pelagic longline and purse seine fisheries. EU and other distant water fishing vessels dominate in some areas (e.g. Madagascar, Comoros, Mauritius, Seychelles). Catches are variable between years however the catch data indicates that the fishery is consistently exceeding the maximum catch levels than is sustainable (e.g. above Maximum Sustainable Yield, Le Corre *et al*. 2012).

The high catches of tuna from purse seines and longlines are associated with key foraging areas for seabirds, including the Seychelles, the Somalia Current, and Mozambique Channel (Le Corre *et al*. 2012).

Many terns, tropicbirds and noddies in the tropical and subtropical regions forage in association with large predatory fish such as tuna (Ramos 2000, Le Corre *et al*. 2012). The tunas drive small forage fish species to the surface, bringing them within the range of seabirds. If the abundance of tuna is reduced through overfishing, these and other seabird species will not be able to forage as successfully (Le Corre *et al*. 2012). The species most likely to be affected by this are the three tropicbird species Red-billed,White-tailed,Red-tailed Tropicbird, the Masked Booby, Greater and Lesser Frigatebird, Brown and Lesser Noddy, and Bridled and Sooty Tern.

The tropical West Indian Ocean ecoregion does not have productive upwelling systems. Aside from tuna fishing in the pelagic region, fisheries are mostly artisanal and restricted to the more productive, if relatively small geographical areas of estuaries, shallow shelf waters and fringing reefs. Gillnet fishing in this region is common especially in the north of the eco-region and around Madagascar. Few seabird species depend directly on inshore or coral reef communities for survival, so fisheries impacts in the coastal region are expected to be minor.

In Somalia, upwelling produces highly productive waters and artisanal fishers work close inshore to target reef fish, large pelagics species (e.g. tunas) and small pelagic shoaling species such as sardine Sardinella sp. and anchovy Engraulis japonicus). In relation to offshore Somalia, the Indian Ocean Tuna Commission declared a time-area closure for tuna catches in the area adjacent to the Somali coast, primarily in response to massive piracy problems. The impacts of both the closure and piracy have been noticeable; with considerably reduced effort across the region[139]

All the countries in the biogeographic region support large, but poorly quantified numbers of artisanal fishers targeting a wide variety of species.

- *Pollution, Oil Spills*

Parts of East Africa are exposed to high levels of risk from oil spills, particularly in the Red Sea, Arabian Sea and along shipping lanes from Southern Africa, the Mozambique Channel and the Red Sea to India (Le Corre *et al*. 2012; Ngoka, 1998; Shobrak & Aloufi, 2014). The Red Sea is known to receive 6836 metric tons of oil each year from shipping which is likely to have an impact on seabirds either through direct mortality or chronic oil pollution/toxicity (Shobrak *et al*. 2014). The region around the Seychelles is also at high risk for oil spills, given the importance of shipping lanes and the numbers of breeding and feeding seabirds (Le Corre *et al*. 2014).

- *Bycatch*

Very little information exists on bycatch within this region, either for longlines (Anderson *et al*. 2011) or gillnets (Zydelis *et al*. 2013). Cape Gannet are known to be killed in demersal longlines in other regions (Watkins *et al*. 2008, Maree *et al*. 2014, Camphuysen *in litt*). There is no information quantifying gillnet bycatch across the region, although the Socotra Cormorant is believed to be caught in gillnets (Zydelis *et al*. 2013). Bycatch of mammals and sea turtles is known from the region, however further dedicated seabird bycatch research is necessary to determine if seabirds are actually being caught.

[139] see annual reports on closures and piracy at the Indian Ocean Tuna Commission scientific committee meetings, available at www.iotc.org.

- *Predation by native species and introduced predators*

Introduced predators such as the Norwegian Rat and feral cats have been introduced on seabird islands across the region (e.g. Seychelles, Tromelin Island) and within important coastal breeding areas (e.g. Saudi Arabia).

Invasion by rats is believed to have contributed to local extirpations of breeding Greater Frigatebirds, Sooty Terns and Brown Noddies, among other seabird species (Le Corre *et al*. 2015) on the island of Tromelin. Eight years after rats were successfully eradicated on Tromelin Island a number of seabird species were returning, at least as non-breeders, suggesting that long term recovery of extirpated populations is possible within the region.

Rats and cats are preying on eggs and chicks of Common Noddy, Bridled Tern and White-cheeked Tern in islands off Djibouti, and is believed to be a particularly severe threat to reproductive success (Shobrak, 2007).

- Harvesting

Egg harvesting occurs across the region, although there is little information on harvest rates. Egg harvesting of Sooty Tern occurs in Madagascar to a high level (Le Corre and Bemanaja, 2009), although harvest of Lesser Crested Tern has been reduced to a great degree following improved protection. Harvesting also occurs in the Red Sea.

In islands off Saudi Arabia, gull and tern species such as Sooty Gull, White-eyed Gull, Caspian Tern, Lesser Crested Tern, Swift Tern, White Cheeked Tern, Bridled Tern, Saunder's Tern are breeding and their eggs are regularly harvested (Shobrak and Aloufi, 2014).

In Djibouti harvesting also occurs (Shobrak, 2007) of Common Noddy, Bridled Tern, White-cheeked Tern.

- Human disturbance of nest sites

Many of the seabird islands around the biogeographic region are exposed to disturbance from people, including tourism activities (Madagascar, Seychelles, Saudi Arabia), coastal fishing, harvesting, and coastal developments. Further information is needed to identify sites which are most at risk from disturbance.

Conservation Action:

- ***Marine Important Bird Areas***

Existing marine IBAs for AEWA listed seabirds are shown in Appendix II. The main gaps for the network include identification of colonies, coastal extension areas and pelagic foraging sites.

Mozambique	2 marine IBAs, 4 species: Lesser Crested Tern, Common Tern, Little Tern, Cape Gannet
Tanzania	8 marine IBAs, 9 species: Sooty Gull, Grey-headed Gull, Lesser Crested Tern, Greater Crested Tern, Roseate Tern Saunders's Tern, Sooty Tern, Brown Noddy Masked Booby
Kenya	10 species Gull-billed Tern, Sooty Gull, Grey-headed Gull, Slender-billed Gull, Caspian Tern, Lesser Crested Tern, Roseate Tern, Saunders's Tern, Great White Pelican, Black-necked Grebe
Madagascar	14 marine IBAs, 5 species: Lesser Crested Tern, Greater Crested Tern, Roseate Tern, Saunders's Tern, Red-tailed Tropicbird
Seychelles	19 marine IBAs, 9 Species: Red-tailed Tropicbird, White-tailed Tropicbird, Great Frigatebird, Lesser Frigatebird, Greater Crested Tern, Roseate Tern, Sooty Tern, Brown Noddy, Lesser Noddy
Mauritius	7 marine IBAs 6 species: Brown Noddy, Lesser Noddy, Sooty Tern, White-tailed Tropicbird, Red-tailed Tropicbird, Roseate Tern
Moyotte	No IBAs for AEWA seabirds
Comoros	No IBAs for AEWA seabirds
Reunion	No IBAs for AEWA seabirds
Swaziland	No IBAs for AEWA seabirds

There is no current work underway to identify new marine IBAs in the region.

- ***Marine Protected Areas***

Existing Protected Areas are shown in Appendix VII.

The Convention on Biological Diversity has identified sites within the region as Ecologically and Biologically Significant Areas (EBSAs). These are shown in Appendix XI.

- ***Ecologically and Biologically Significant Areas***

Appendix IVI identified the qualifying EBSAs within this eco-region.

- ***Island restoration***

Nature Seychelles (BirdLife Seychelles) is carrying out rat eradication projects[140]

- **Relevant Multi-lateral Environmental Agreements (MEAs)**

Table 23 outlines the relevant MEAs that are focused on Eastern African marine biodiversity conservation and/or mitigation of key threats to the marine environment.

[140] http://www.natureseychelles.org/what-we-do/island-restoration/40-nature-seychelles/what-we-do-conservation/170-island-ecosystem-restoration

Table 23, Main international & regional frameworks & organisations in the East Africa region focused on relevant threats to AEWA listed seabirds and conservation actions

MEAs, Convention name	Countries	Fisheries Management, fish stocks & bycatch	Introduced predators	Marine Planning, coastal zone management	Harvesting	Climate change	Oil spill	Mining (oil and gas & deep sea)	Marine Protected Areas & Marine Important Bird Area Identification	Species Action Plans & Species specific strategies/prioritisation
Nairobi Convention[141]	Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania and the Republic of South Africa.			✓			✓		✓	✓
Kuwait Convention-ROPME[142]	Coastal Areas of Bahrain, I.R. Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates									
Jeddah Convention[143]	Djibouti, Egypt, Jordan, Palestine, Saudi Arabia, Somalia, Sudan and Yemen									
RAMSAR[144]	Comoros, France,, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania and the Republic of South Africa. Iraq, Iran, Kuwait, United Arab Emirates, Oman, Egypt. Yemen								✓	
Indian Ocean Commission[145]	Union of Comoros, Madagascar, France-La Reunion,, Seychelles, Maurice,	✓	✓						✓	
CBD- EBSA[146]	All countries								✓	
CMS[147]	Comoros, France,, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania and the Republic of South Africa., Iran, Kuwait, United Arab Emirates, Egypt. Yemen, Saudi Arabia, Djibouti , Eritrea						✓			
RFMO- IOTC [148]	Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania, Eritrea, European Union, Iran, Oman, Sudan,Yemen.	✓								

ICES [149]		✓								
IMO Marpol[150]	All except Somalia, Eritrea,						✓			
BirdLife International [151]	Partners in Djibouti, Egypt, Kenya, Madagascar, Mauritius, Seychelles,	✓	✓				✓		✓	✓

Explanation of MEA/Convention names and roles

[141] The Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention), the contracting parties are Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, Tanzania and the Republic of South Africa. http://www.unep.org/nairobiconvention/ . The Nairobi Convention provides a mechanism for regional cooperation, coordination and collaborative actions in the Eastern and Southern African region that enables the Contracting Parties to harness resources and expertise from a wide range of stakeholders and interest groups towards solving interlinked problems of the coastal and marine environment including critical national and transboundary issues.

[142] The Regional Conference of Plenipotentiaries on the Protection and Development of the Marine Environment and the Coastal Areas of Bahrain, I.R. Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (ROPME) http://ropme.org/home.clx The goal of ROPME is to coordinate the Member States efforts towards protection of the water quality in ROPME Sea Area and protect the environment systems as well as marine living and to abate the pollution caused by the development activities of the Member States.

[143] The Jeddah Convention, Red Sea and Gulf of Aden (PERGSA), http://www.unep.ch/regionalseas/main/persga/redconv.html and http://www.unep.ch/regionalseas/main/persga/red.html The main focus of the Convention concerns the prevention, reduction and fight against pollution. It also includes an Article directing the contracting parties to establish a regional organization to implement the agreement.

[144] The Convention on Wetlands of International Importance, RAMSAR, http://www.ramsar.org/about-the-ramsar-convention

[145] The Indian Ocean Commission, including the Smart Fish initiative http://commissionoceanindien.org/activites/smartfish/ , sustainable fisheries management http://commissionoceanindien.org/activites/gouvernance-des-peches-dans-les-pays-du-sud-ouest-de-locean-indien/la-banque-mondiale-accorde-5-millions-de-dollars-a-la-coi-pour-lappui-a-la-cpsooi-et-ses-etats-membres-29-sept-14-paris/ and invasive species http://commissionoceanindien.org/activites/biodiversite/activites-activities/atelier-especes-marines-envahissantes-marine-invasive-species-workshop/

[146]The Convention on Biological Diversity (CBD) has held a workshop on Ecologically and Biologically Significant Areas (EBSAs) in the Indian Ocean in 2012 https://www.cbd.int/ebsa/ and https://www.cbd.int/doc/?meeting=EBSA-SIO-01

[147]The Convention on Migratory Species (CMS) http://www.cms.int/en/documents/strategic-plan/welcome

[148] Regional Fisheries Management Organisation, Indian Ocean Tuna Commission (IOTC) http://www.iotc.org/ The Indian Ocean Tuna Commission (IOTC) is an intergovernmental organisation responsible for the management of tuna and tuna-like species in the Indian Ocean

[149] International Council for the Exploration of the Sea, provision of fisheries management advice, quotas etc. and advice on seabird bycatch http://www.ices.dk/Pages/default.aspx

[152] International Maritime Organisation (IMO) The International Convention for the Prevention of Pollution from Ships (MARPOL) http://www.imo.org/en/Pages/Default.aspx

[151] BirdLife International Marine Programme, www.birdlife.org,

[152] International Maritime Organisation (IMO) The International Convention for the Prevention of Pollution from Ships (MARPOL) http://www.imo.org/en/Pages/Default.aspx

[151] BirdLife International Marine Programme, www.birdlife.org,

Knowledge Gaps & Research Needs

- Extent of impact (and most vulnerable sites) for invasive predators on AEWA seabirds.
- Seabird distribution and marine IBAs within the region.
- Extent of gillnet fishing, and impact on seabirds (bycatch).
- Most vulnerable sites to human disturbance.
- Identification of land-based and at-sea threats for seabird species (e.g. Frigatebirds, Tropicbirds).
- Identification of marine IBAs for all seabird species within the region.
- Assessment of gillnet bycatch, and longline bycatch.

Conservation action needed:

- Identification of marine Important Bird Areas (colony sites, foraging areas etc).
- Protection of marine IBAs in Marine Protected Areas and in terrestrial networks for important breeding sites.
- Identification of threats and management of EBSAs for human based threats (e.g. over-fishing, bycatch).
- Regional prioritisation of seabird breeding islands where eradication of rats and other introduced predators can be effective & knowledge sharing on techniques and best practice.
- Regional oil spill response plan developed with updated information on seabird distribution.

Conclusions and Recommendations for future regional conservation action

AEWA listed seabirds are threatened across the African-Eurasian flyway by a number of threats. The threats discussed within this review are likely to be contributing to the declining populations observed in many of the species covered by the Agreement. Despite the importance of these threats, monitoring of both seabirds and threats remains very patchy, even in areas which are comparatively well studied (e.g. European region). This has made regional level assessments of threats to seabirds very difficult, as well as the prioritisation of regional level actions for conservation. In order to fill the critical knowledge gaps and develop effective conservation activity there is a strong need for regional scale guidance on seabird threat mitigation.

Across the different AEWA biogeographic regions the threats to seabirds differ in their scale and severity. Despite these differences, there are many key threats which are consistent across the entire AEWA region and for which collective, regional conservation action could provide benefits to seabird populations. The main key threats across the AEWA region include the impacts of climate change, over-fishing, and bycatch in fisheries, invasive predators, oil spills, contaminants and litter and human developments on land and at sea. Within each regional section, the key recommendations have been made for priority conservation and regional level activity. The priority actions at a regional level can be broadly summarised as follows:

Invasive predators

- Develop an understanding of the extent of impact (and most vulnerable sites) for invasive predators on AEWA seabirds and the cumulative impact on a species across its breeding range.
- Regional prioritisation of seabird breeding islands where eradication of rats and other introduced predators can be effective & knowledge sharing on techniques and best practice.

Seabird bycatch

- Understand the extent and scale of seabird bycatch in gillnets, including the collection of data on gillnet fishing effort.
- Collection of seabird bycatch records from National Governments, through AEWA national reporting schedule and through promotion of existing regional MEAs (e.g. RFMOS).
- Develop regional guidance for sustainable use of species which are particularly affected by bycatch and are also exploited by humans (e.g. harvesting).

Marine IBA identification and protection

- Identification of marine IBAs for all seabird species within the region, including non-breeding season, pelagic sites and coastal extension areas.
- Protection of marine IBAs in Marine Protected Areas and in terrestrial networks for important breeding sites.
- Identification of threats and management of EBSAs for human based threats (e.g. over-fishing, bycatch).

Regional Oil spill response

- Develop a series of regional oil spill response plans specifically designed for seabird conservation- identifying the key coastal and at sea areas where response would be most urgently required. .

Harvesting

- Collection of legal hunting data from National Governments, through AEWA national reporting schedule or existing regional MEAs.

- Collection of illegal hunting estimates National Governments, through AEWA national reporting schedule or existing regional MEAs.
- Regional assessment of cumulative impact at flyway/regional scale on populations from legal harvest, illegal harvest and fisheries bycatch. Develop regional guidance on sustainable harvest levels based on combined mortality (bycatch+ harvesting).

Fisheries management:

- Promote sustainable fisheries management across the different biogeographic regions, and regional analysis of sustainable catch levels for forage fisheries (ensuring 1/3 for the birds)
- Promote protection of prey availability around key breeding colonies.

Plastics and contaminants:

- Promote regional sharing of information on the impacts of marine litter, and contaminant levels across the region. Develop a regional database for different AEWA listed seabirds, and level of marine litter ingested/contaminant levels.

Marine Planning

- Assess the cumulative impact of wind farms, oil and gas platforms across the region on AEWA listed seabirds and develop species specific flyway guidance to ensure marine spatial planning initiatives take cumulative impacts into account in planning future development areas.

Next steps for collaborative regional action across AEWA region

In order to further AEWA's seabird conservation work across the African Eurasian flyway, it is necessary to prioritise the above recommendations for regional action, in relation to AEWA's strategic priorities and capacity and expertise. Furthermore, it is necessary to understand the roles of existing multilateral environmental agreements and mechanisms concerned with marine conservation and the management of human activities and threats. The different MEAs offer an opportunity for AEWA to collaboratively work to conserve seabirds across the African-Eurasian flyway. The most relevant of these processes have been identified within each regional section of this review, however this review has not provided recommendations for engagement with individual MEAs. Instead, it is recommended that a strategic assessment of these MEAs is carried out to clarify the following key questions:

- What is the exact remit of the MEA, and how does it fit within AEWA's goals for seabird conservation?
- How is the MEA currently working? Is it currently effective for seabird conservation, or could it become more so?
- Could AEWA engage effectively in this process?

There are some clear opportunities for AEWA to engage with existing MEAs across a number of conservation themes and threat management, for example in engaging Regional Fisheries Management Organisations on seabird bycatch, or with regional conventions on harvest data recording and sustainable seabird harvesting advice (e.g. CAFF). In each case, AEWA's role could include the following:

- Provide guidance to national governments on the existing processes and share best practice
- Encourage national governments to engage more closely in existing MEAs to ensure that seabird conservation outcomes are maximised across the AEWA region.
- AEWA Secretariat engagement with the existing MEAs, producing Memoranda of Understanding for joint work and participation in meetings etc.

There is a clear need for the AEWA Secretariat to convene a multi-stakeholder workshop, in order to:

- Define and prioritise AEWA's engagement with seabird conservation across the region and in respect to existing international and regional fora
- Develop a strategic action plan for future AEWA engagement in seabird conservation, including the prioritisation of conservation actions targeting specific threats within AEWA sub-regions.
- Highlight the current gaps in conservation for seabirds covered by the Agreement and encourage Parties and other stakeholders to strengthen national level work on marine protected areas, pollution, sustainable harvesting, marine spatial planning, seabird bycatch monitoring and mitigation and fisheries management.
- Provide an opportunity to strengthen existing networks and cooperation with international and regional processes and management bodies, including the development of specific resolutions of cooperation between AEWA and other agreements and bodies.

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Appendices

Appendix I. Full list of AEWA listed seabird species, with the global Red List category provided.

Species	CommonName	Red List Category
Alcidae		
Alca torda	Razorbill	LC
Alle alle	Little Auk	LC
Cepphus grylle	Black Guillemot	LC
Uria aalge	Common Murre	LC
Uria lomvia	Thick-billed Murre	LC
Fratercula arctica	Atlantic Puffin	LC[152]
Anatidae		
Bucephala clangula	Common Goldeneye	LC
Clangula hyemalis	Long-tailed Duck	VU
Melanitta fusca	Velvet Scoter	EN
Melanitta nigra	Common Scoter	LC
Mergus merganser	Goosander	LC
Mergus serrator	Red-breasted Merganser	LC
Somateria mollissima	Common Eider	LC
Somateria spectabilis	King Eider	LC
Polysticta stelleri	Steller's Eider	VU
Aythya marila	Greater Scaup	LC
Gaviidae		
Gavia adamsii	Yellow-billed Loon	NT
Gavia arctica	Arctic Loon	LC
Gavia immer	Common Loon	LC
Gavia stellata	Red-throated Loon	LC
Fregatidae		
Fregata ariel	Lesser Frigatebird	LC
Fregata minor	Great Frigatebird	LC
Laridae		
Larus argentatus	European Herring Gull	LC
Larus audouinii	Audouin's Gull	NT
Larus cachinnans	Caspian Gull	LC
Larus canus	Mew Gull	LC
Larus cirrocephalus	Grey-headed Gull	LC
Larus dominicanus	Kelp Gull	LC
Larus fuscus	Lesser Black-backed Gull	LC
Larus genei	Slender-billed Gull	LC

[152] In 2015, The Global Red List status is currently under review for this species, with an up-list of Vulnerable proposed

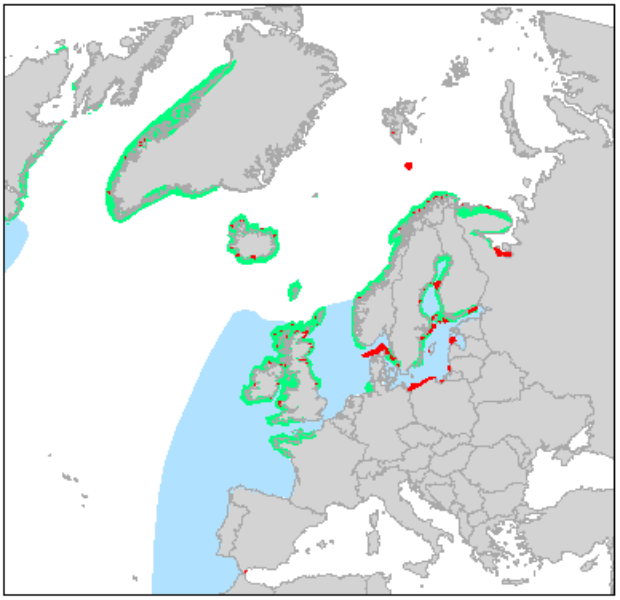
Larus glaucoides	Iceland Gull	LC
Larus hartlaubii	Hartlaub's Gull	LC
Larus hemprichii	Sooty Gull	LC
Larus hyperboreus	Glaucous Gull	LC
Larus ichthyaetus	Pallas's Gull	LC
Larus leucophthalmus	White-eyed Gull	NT
Larus marinus	Great Black-backed Gull	LC
Larus melanocephalus	Mediterranean Gull	LC
Larus michahellis	Yellow-legged Gull	LC
Larus ridibundus	Black-headed Gull	LC
Xema sabini	Sabine's Gull	LC
Hydrocoloeus minutus	Little Gull	LC
Rissa tridactyla	Black-legged Kittiwake	LC
Anous stolidus	Brown noddy	LC
Anous tenuirostris	Lesser noddy	LC
Chlidonias niger	Black Tern	LC
Gelochelidon nilotica	Common Gull-billed Tern	LC
Hydroprogne caspia	Caspian Tern	LC
Onychoprion anaethetus	Bridled Tern	LC
Onychoprion fuscatus	Sooty Tern	LC
Sterna dougallii	Roseate Tern	LC
Sterna hirundo	Common Tern	LC
Sterna paradisaea	Arctic Tern	LC
Sterna repressa	White-cheeked Tern	LC
Sterna vittata	Antarctic Tern	LC
Sternula albifrons	Little Tern	LC
Sternula balaenarum	Damara Tern	NT
Sternula saundersi	Saunders's Tern	LC
Thalasseus bengalensis	Lesser Crested Tern	LC
Thalasseus bergii	Greater Crested Tern	LC
Thalasseus maximus	Royal Tern	LC
Thalasseus sandvicensis	Sandwich Tern	LC
Pelecanidae		
Pelecanus onocrotalus	Great White Pelican	LC
Phaethontidae		
Phaethon aethereus	Red-billed Tropicbird	LC
Phaethon lepturus	White-tailed Tropicbird	LC
Phaethon rubricauda	Red-tailed Tropicbird	LC
Phalacrocoracidae		
Phalacrocorax capensis	Cape Cormorant	EN
Phalacrocorax carbo	Great Cormorant	LC
Phalacrocorax neglectus	Bank Cormorant	EN
Phalacrocorax nigrogularis	Socotra Cormorant	VU
Microcarbo coronatus	Crowned Cormorant	NT

Podicipedidae		
Podiceps auritus	Horned Grebe	LC
Podiceps cristatus	Great Crested Grebe	LC
Podiceps grisegena	Red-necked Grebe	LC
Podiceps nigricollis	Black-necked Grebe	LC
Scolopacidae		
Phalaropus fulicarius	Red Phalarope	LC
Phalaropus lobatus	Red-necked Phalarope	LC
Stercorariidae		
Catharacta Skua	Great Skua	LC
Stercorarius longicaudus	Long-tailed Skua[153]	LC
Spheniscidae		
Spheniscus demersus	African Penguin	EN
Sulidae		
Morus bassanus	Northern Gannet	LC
Morus capensis	Cape Gannet	VU
Sula dactylatra	Masked Booby	LC

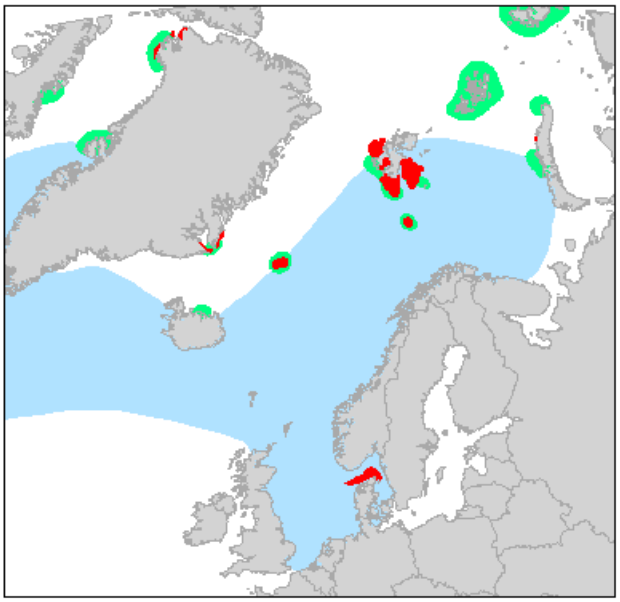
[153] BirdLife International uses the common name 'Long-tailed Jaegar'

Appedix II: Marine Important Bird Areas for each AEWA listed seabird species, including breeding and non-breeding range across AEWA region. Species are ordered by family (see Appendix I). Light blue= non-breeding range, Green= Breeding/or year round presence. Red= marine Important Bird Area.

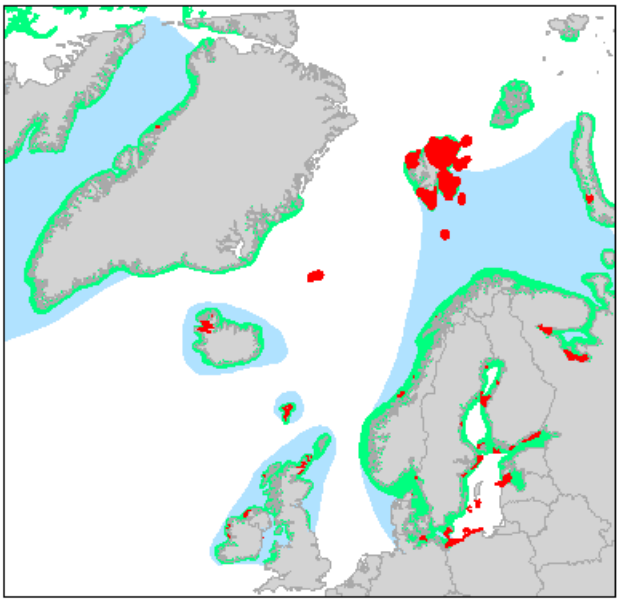
Razorbill



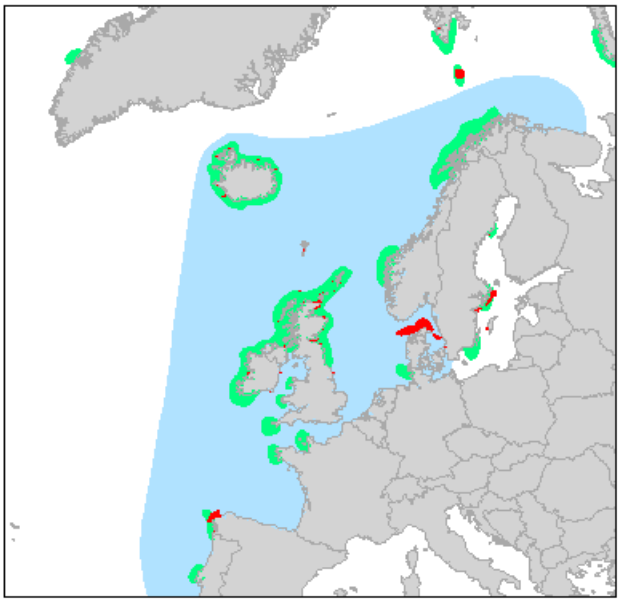
Little Auk



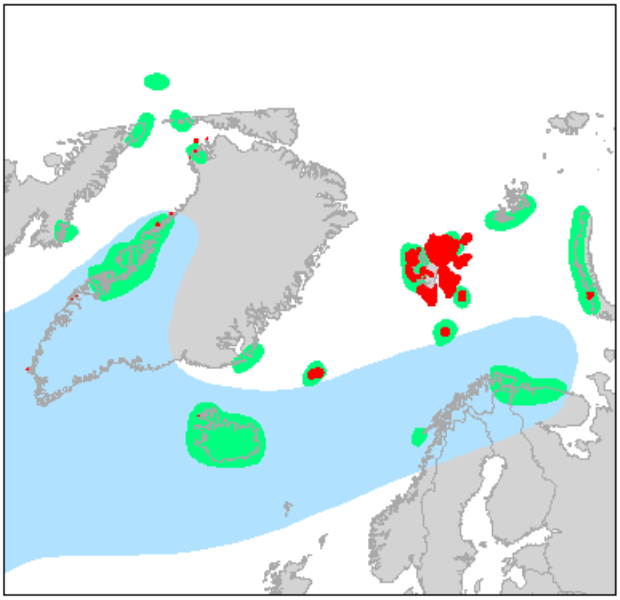
Black Guillemot



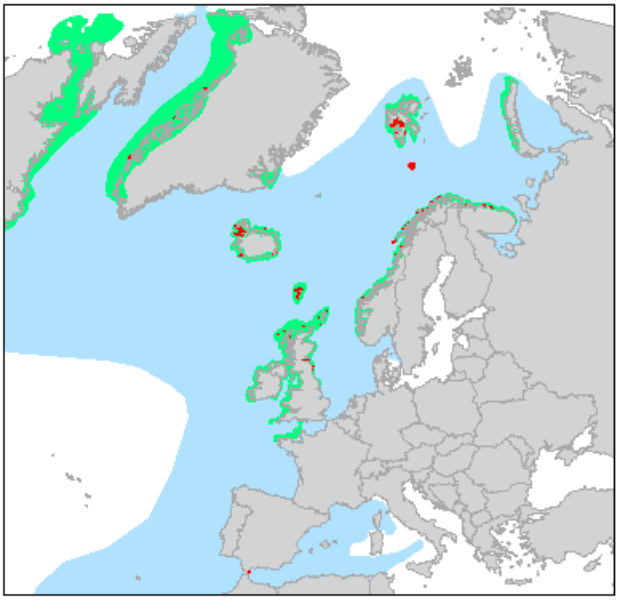
Common Murre



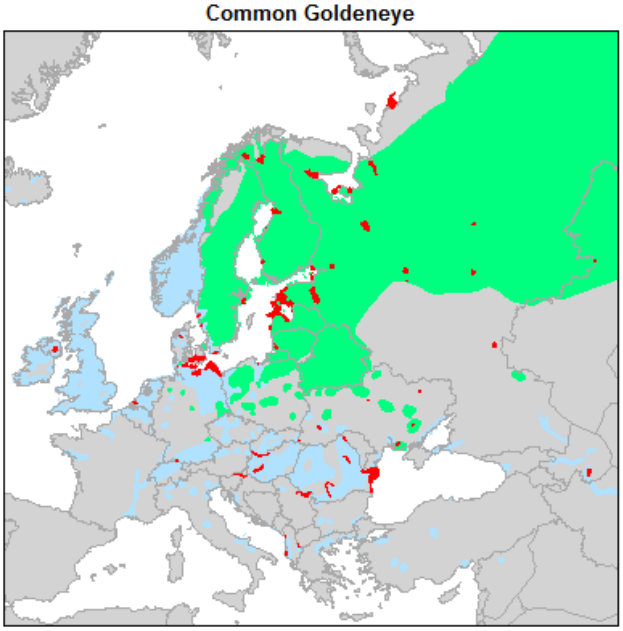
Thick-billed Murre



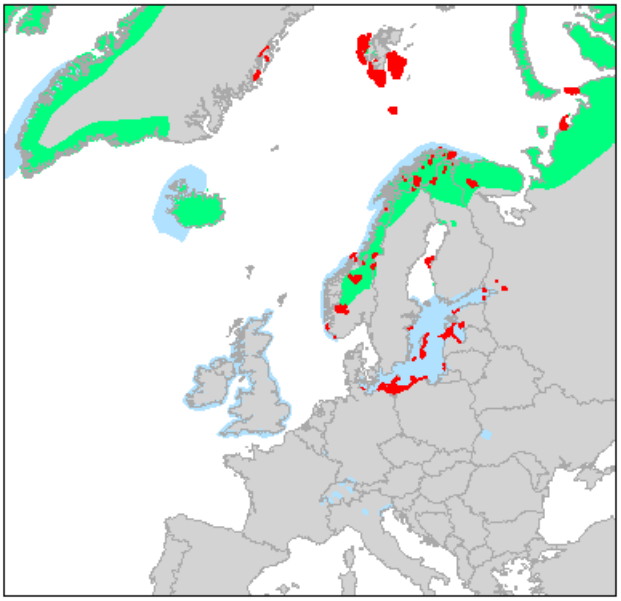
Atlantic Puffin



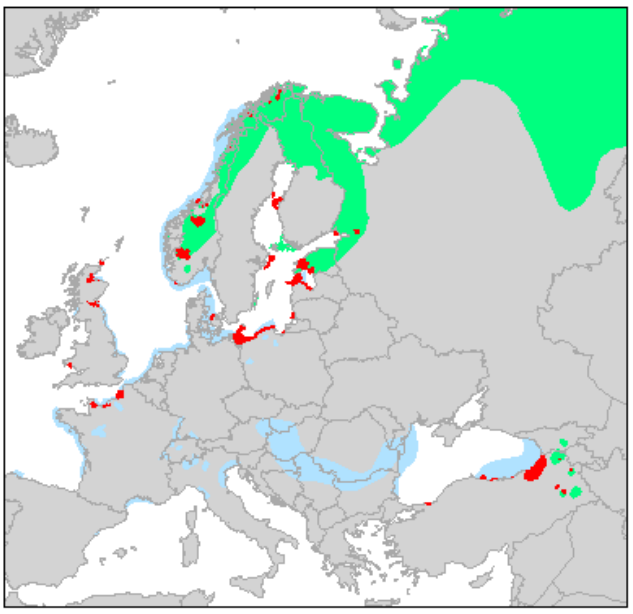
Common Goldeneye



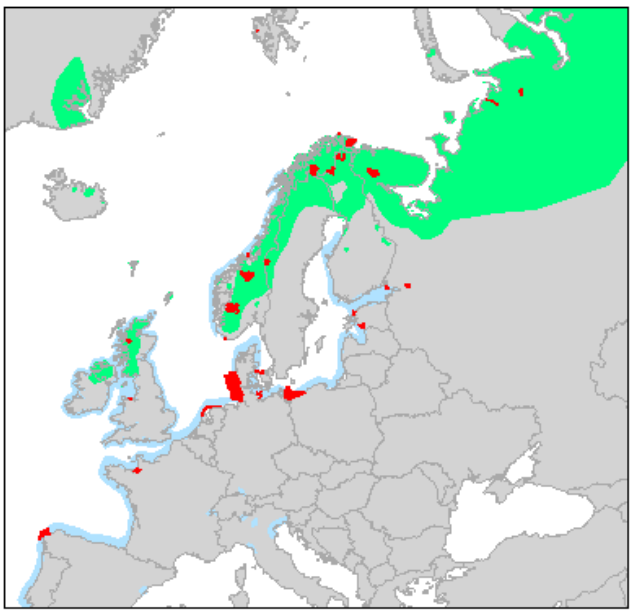
Long-tailed Duck



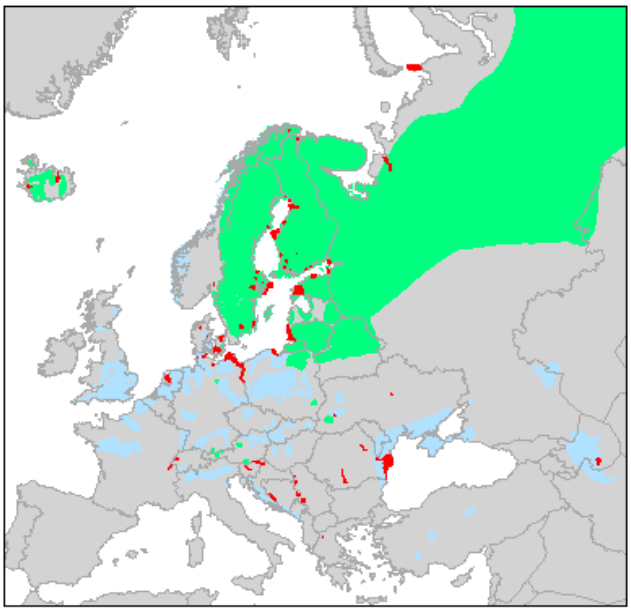
Velvet Scoter



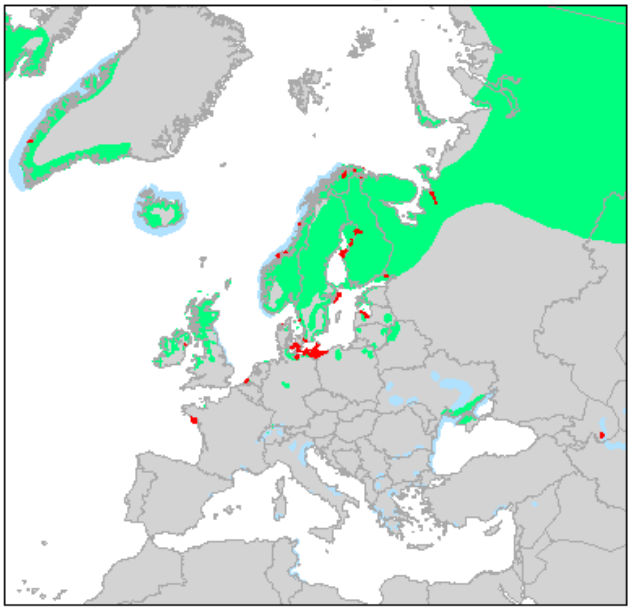
Common Scoter



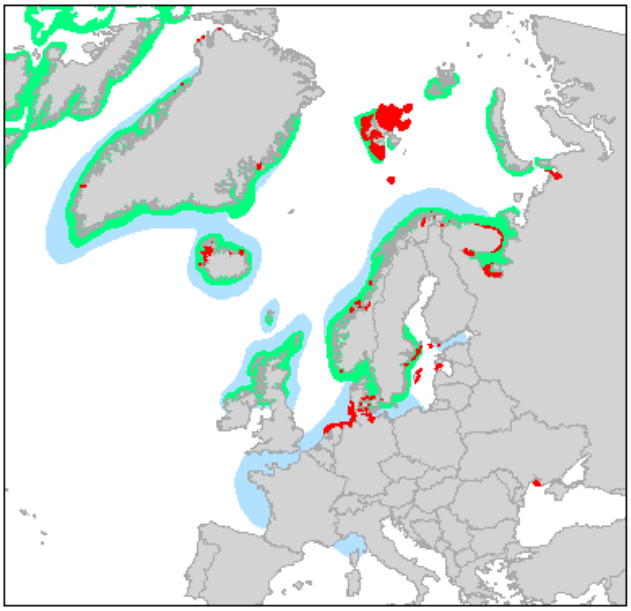
Goosander



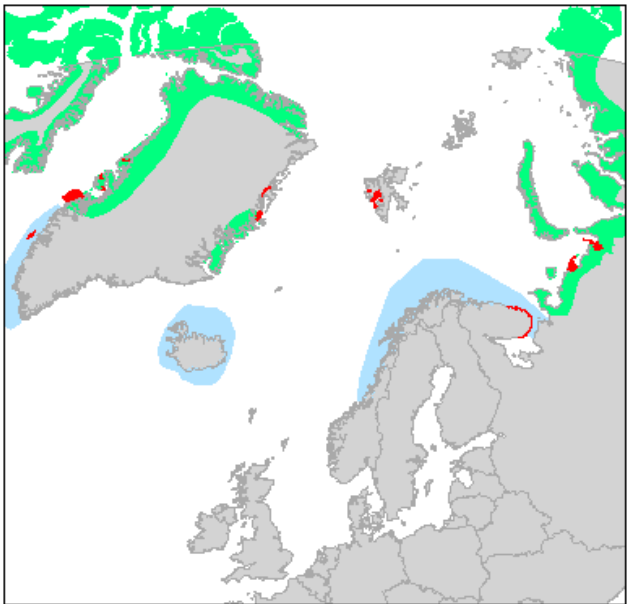
Red-breasted Merganser



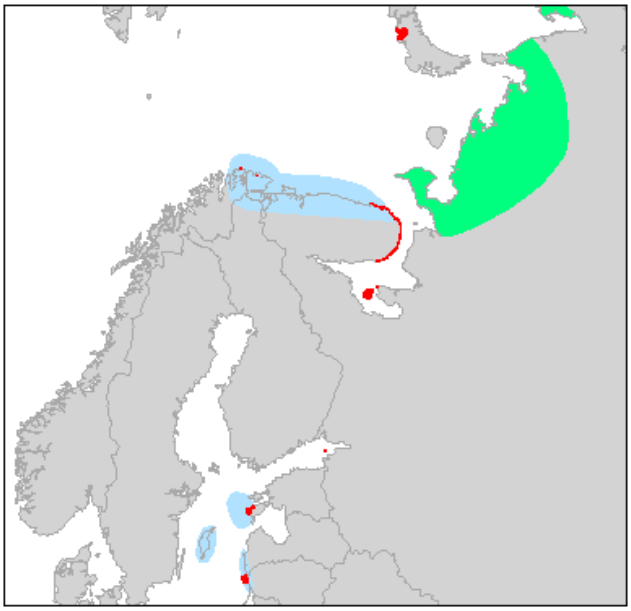
Common Eider



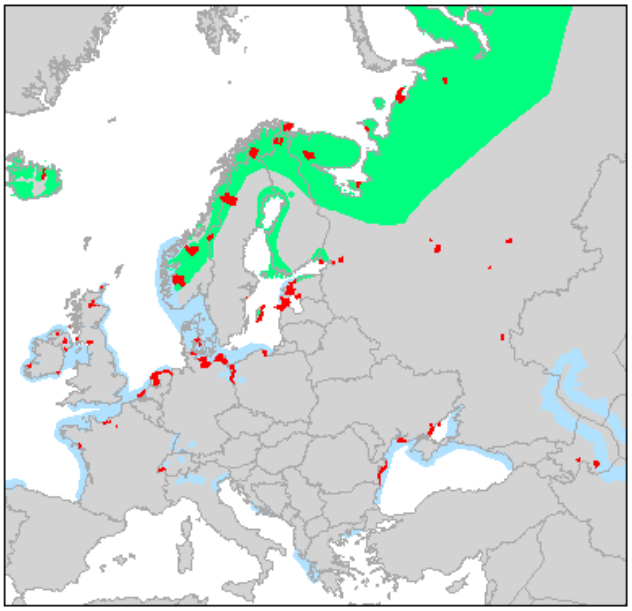
King Eider



Steller's Eider

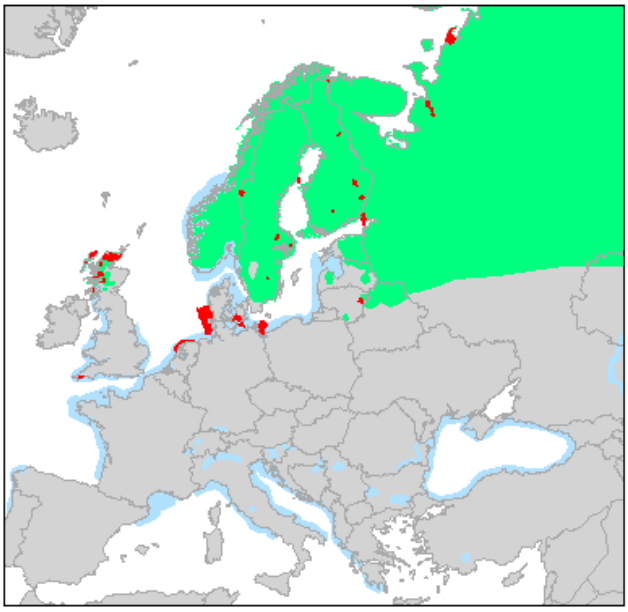


Greater Scaup

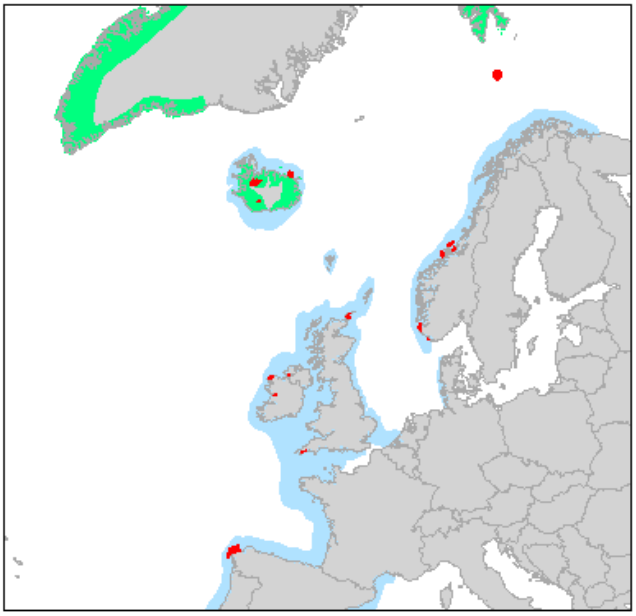


Yellow-billed Loon

Arctic Loon

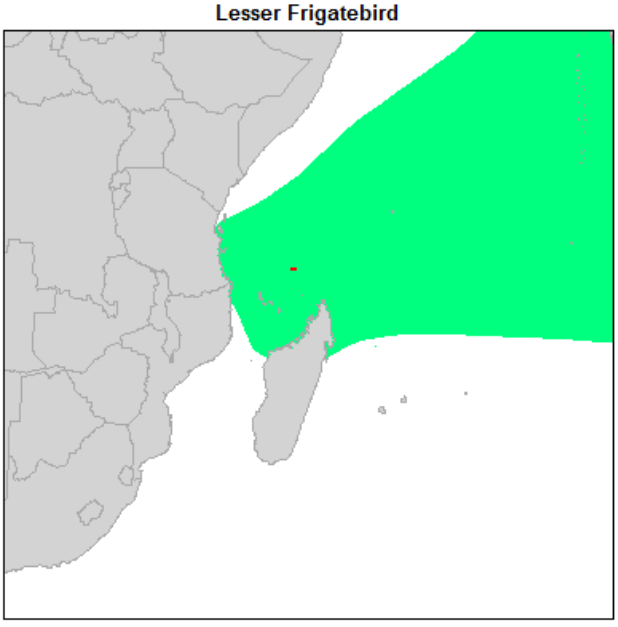


Common Loon

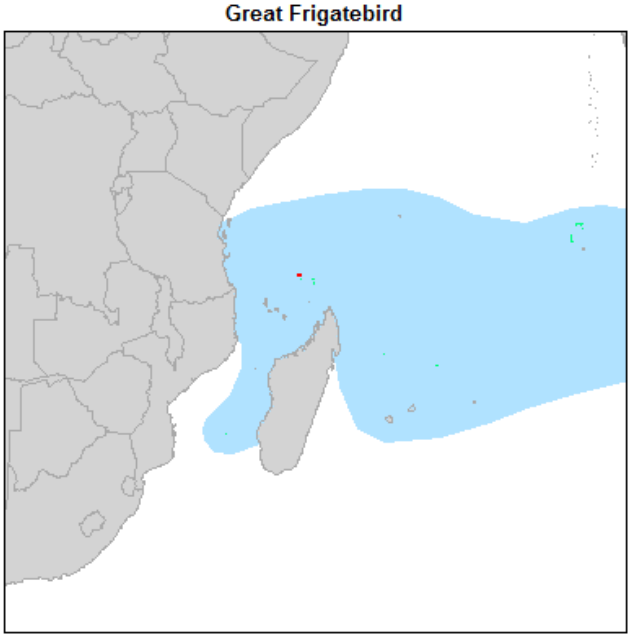


Red-throated Loon

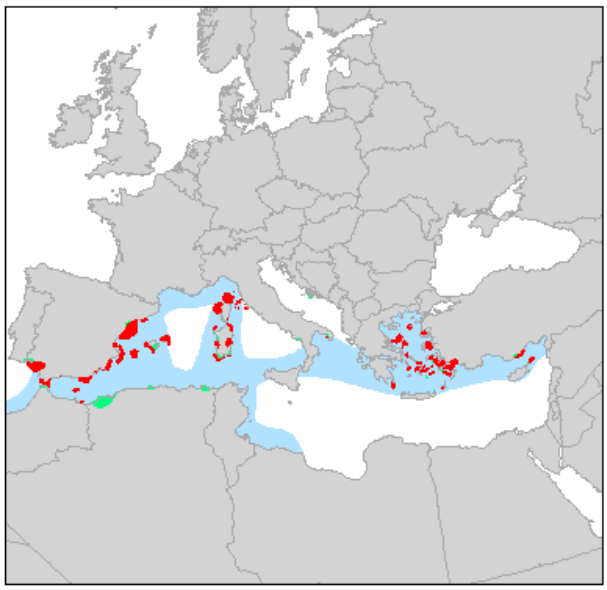
Lesser Frigatebird



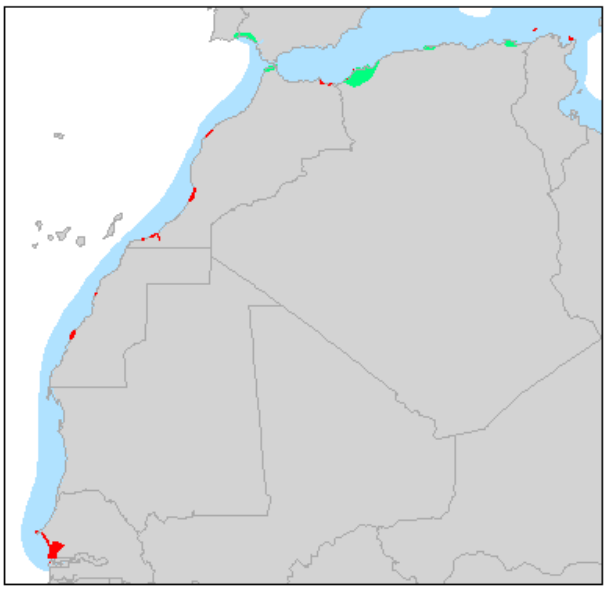
Great Frigatebird



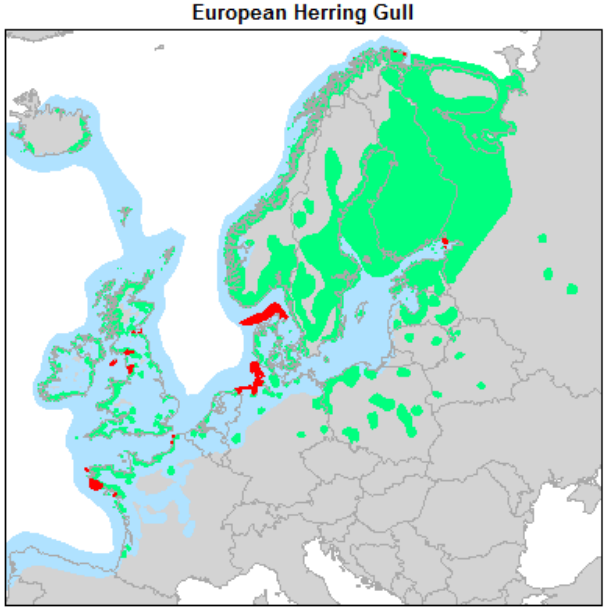
Audouin's Gull



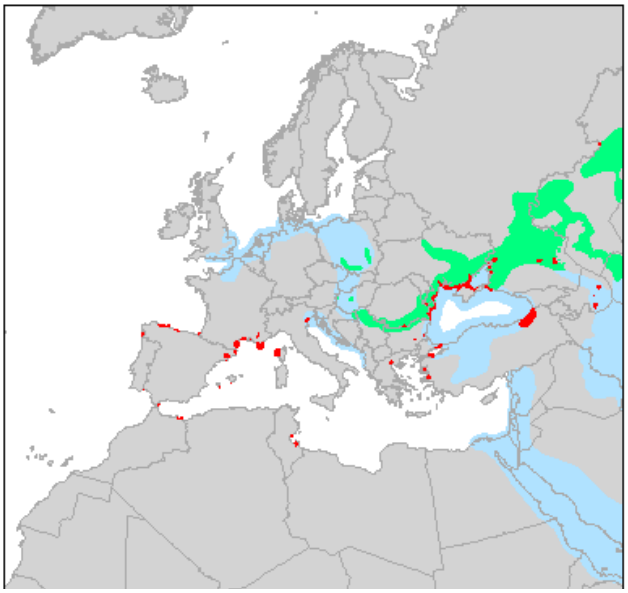
Audouin's Gull



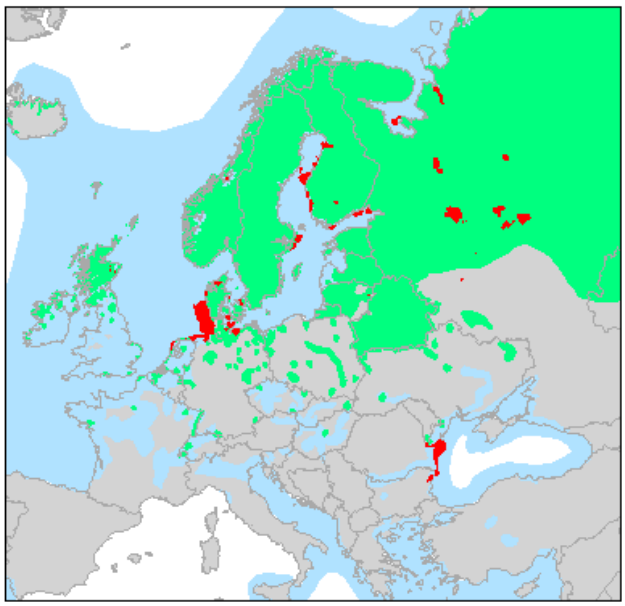
European Herring Gull



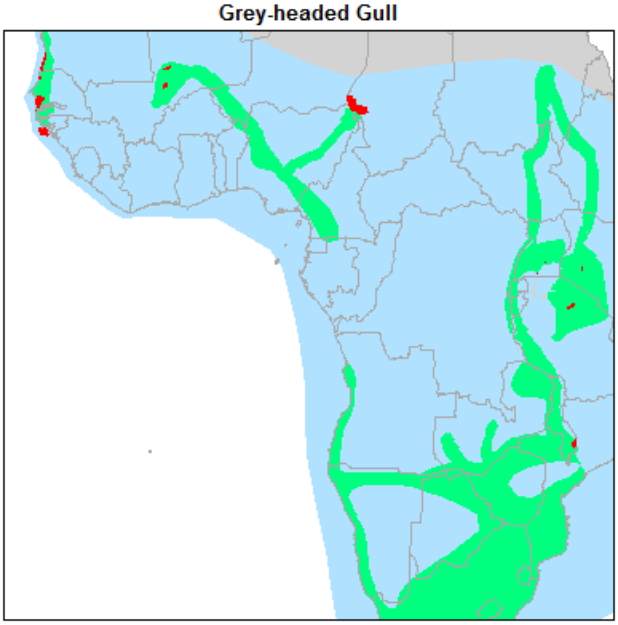
Caspian Gull



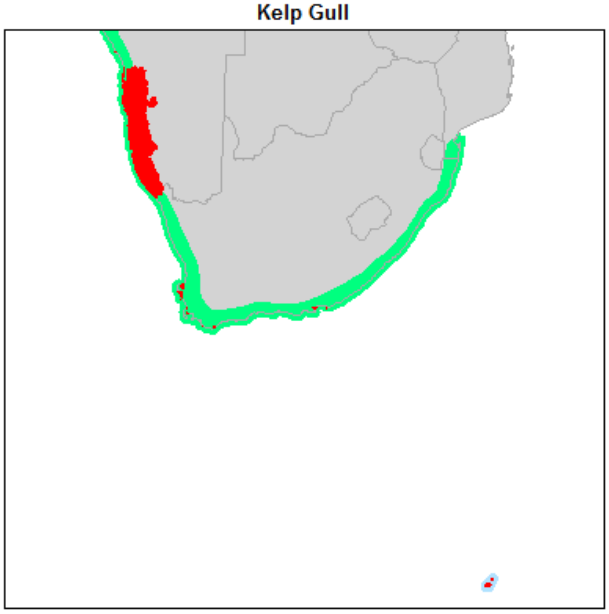
Mew Gull



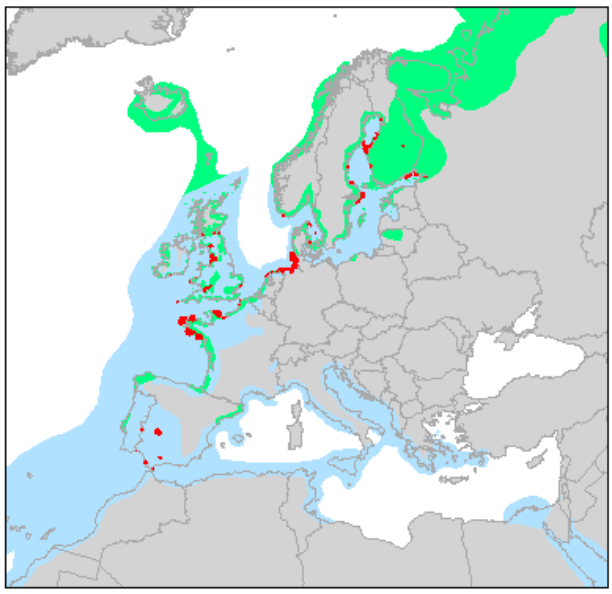
Grey-headed Gull



Kelp Gull

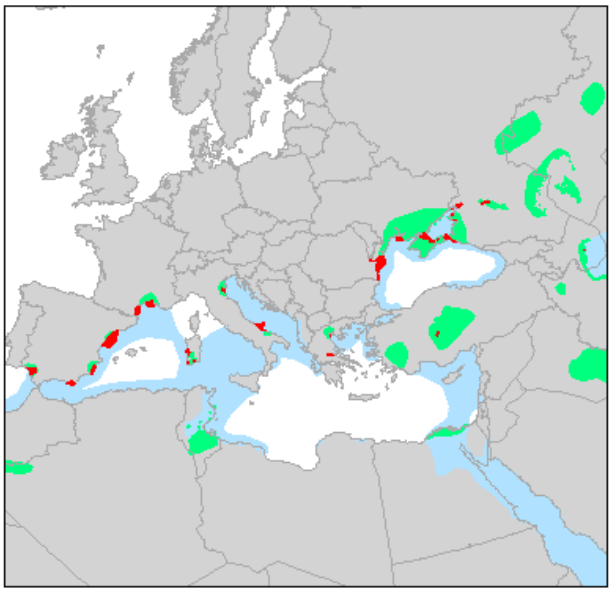


Lesser Black-backed Gull

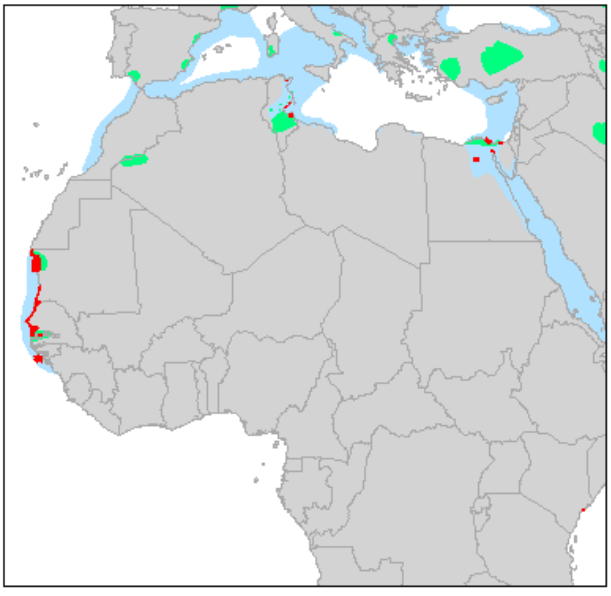


Lesser Black-backed Gull

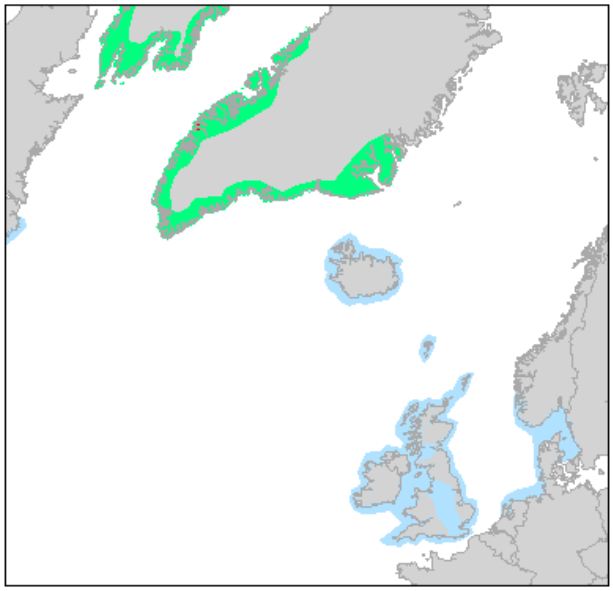
Slender-billed Gull



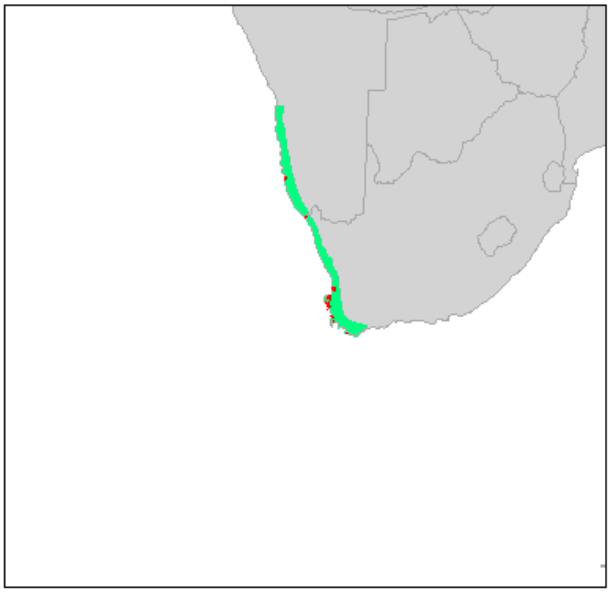
Slender-billed Gull



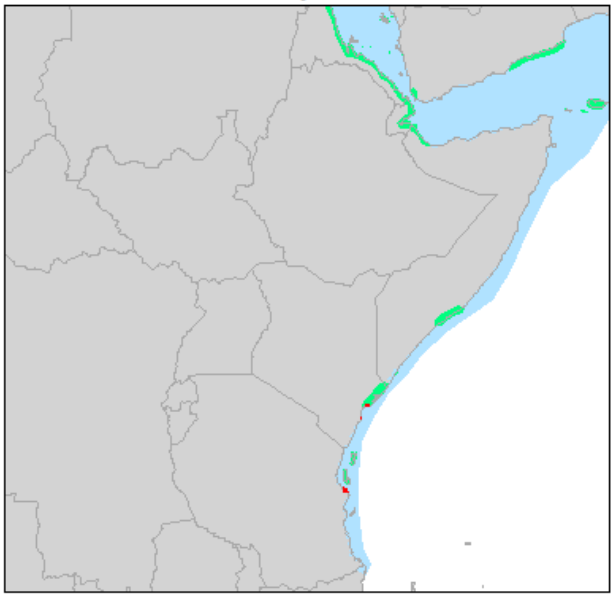
Iceland Gull



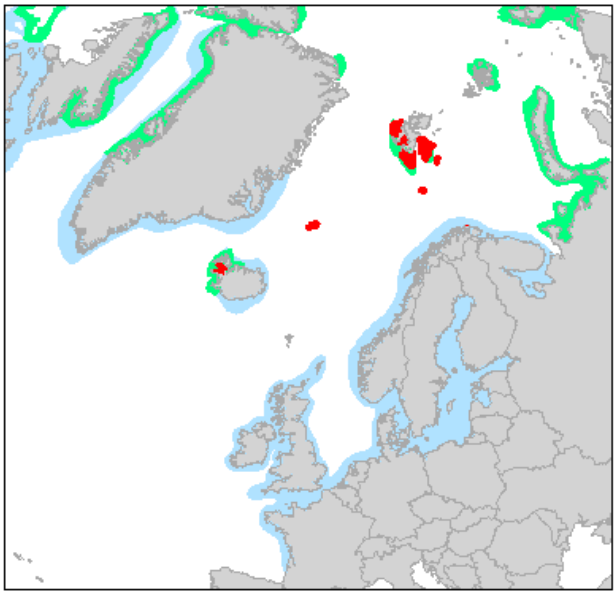
Hartlaub's Gull



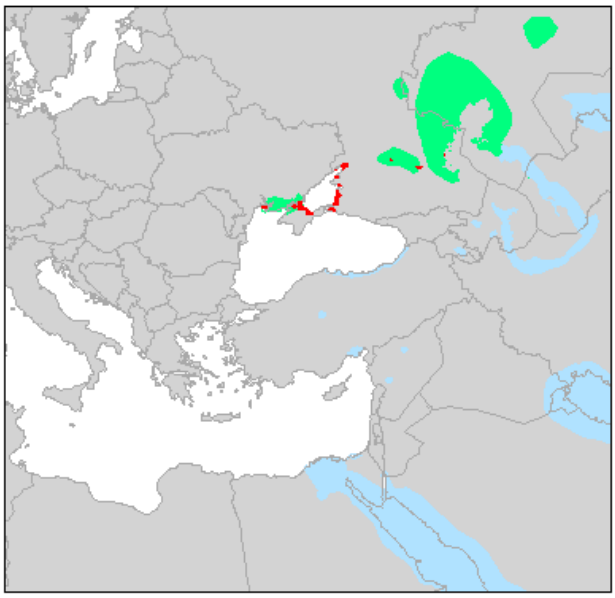
Sooty Gull



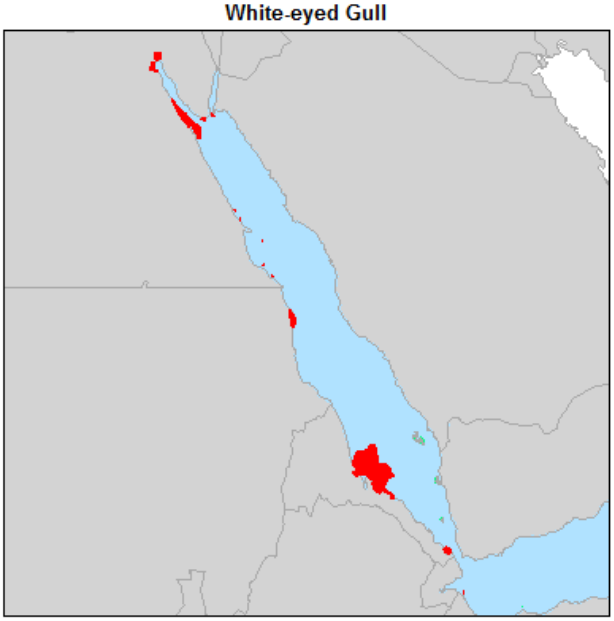
Glaucous Gull



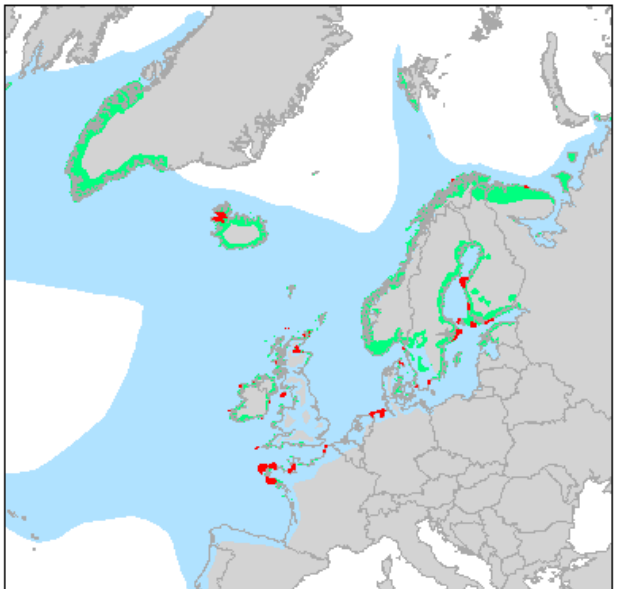
Pallas's Gull



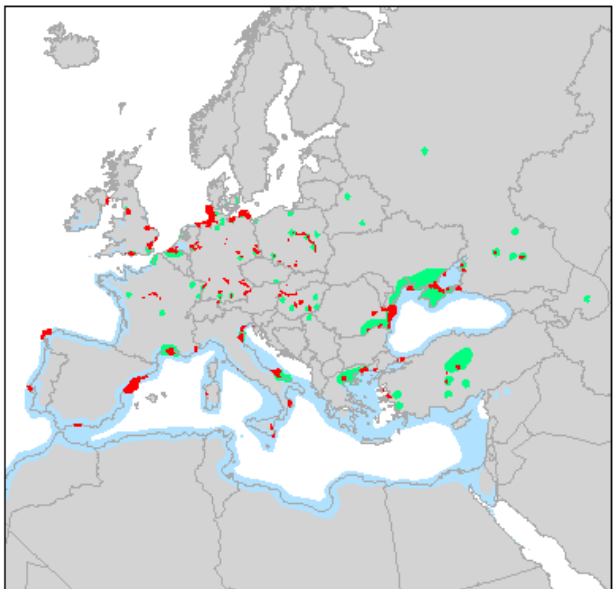
White-eyed Gull



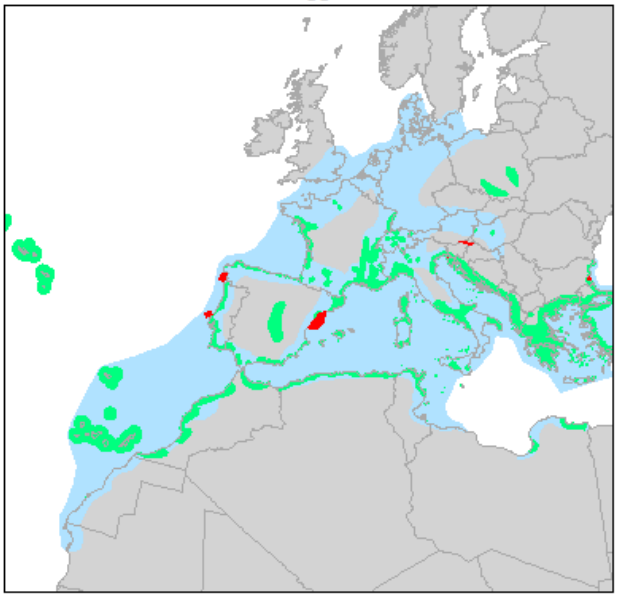
Great Black-backed Gull



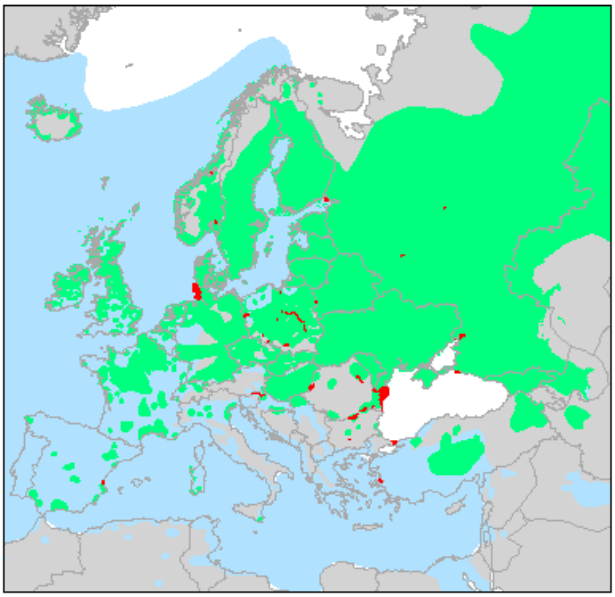
Mediterranean Gull



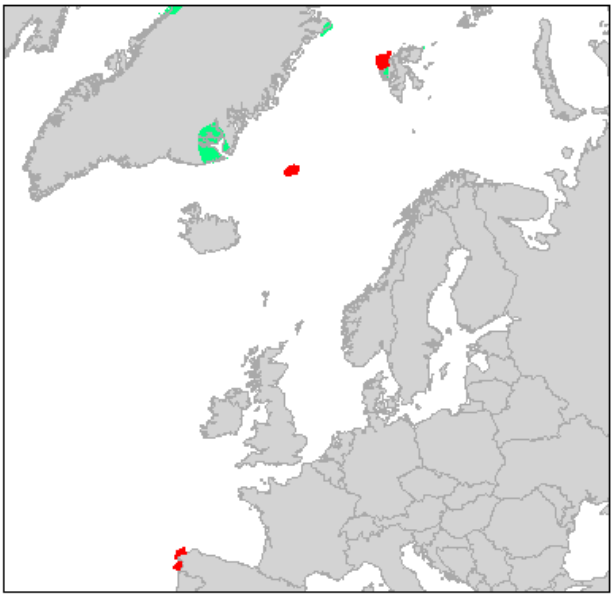
Yellow-legged Gull



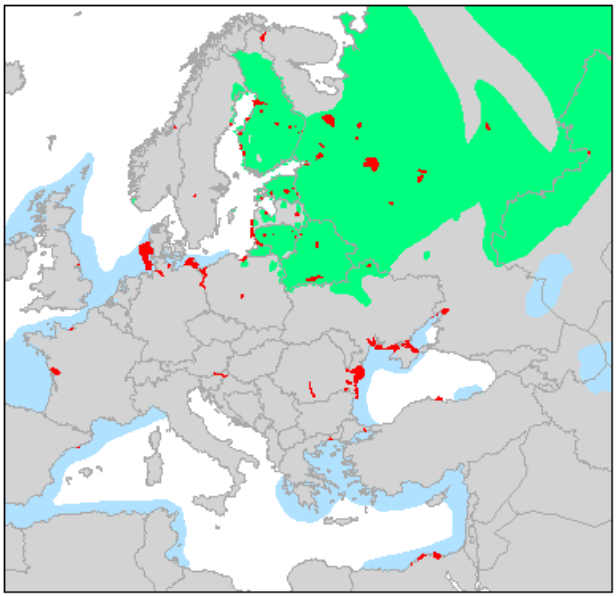
Black-headed Gull



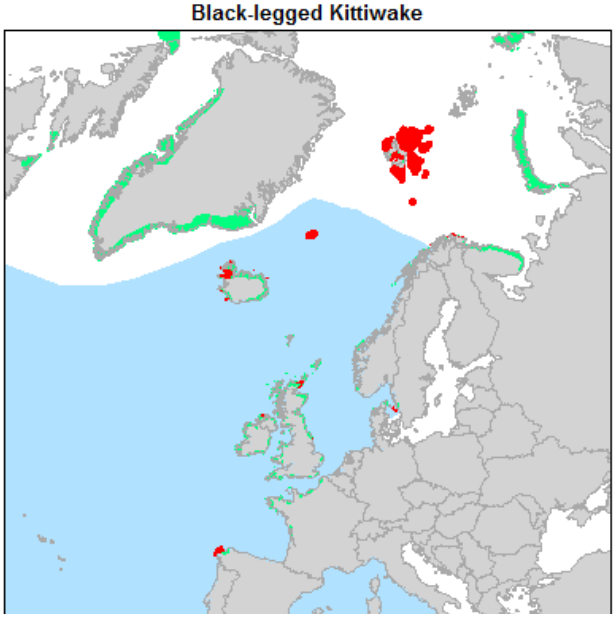
Sabine's Gull



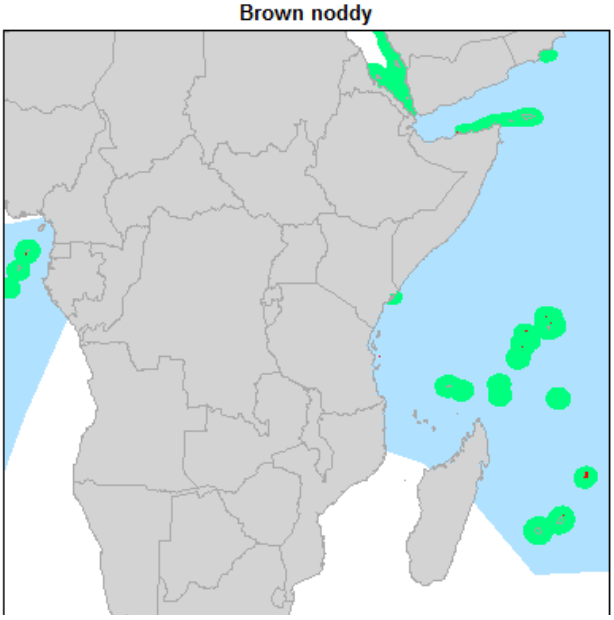
Little Gull



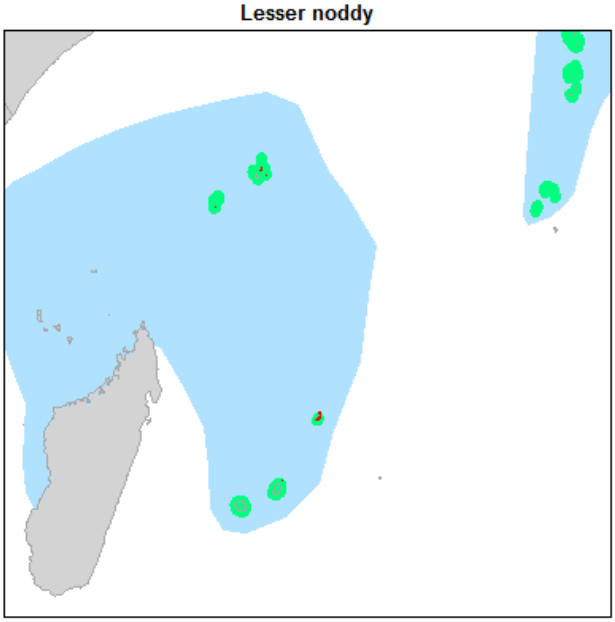
Black-legged Kittiwake



Brown noddy

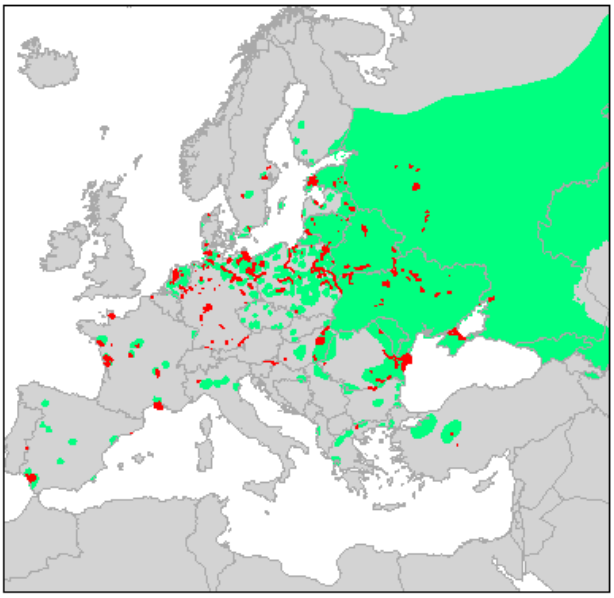


Lesser noddy

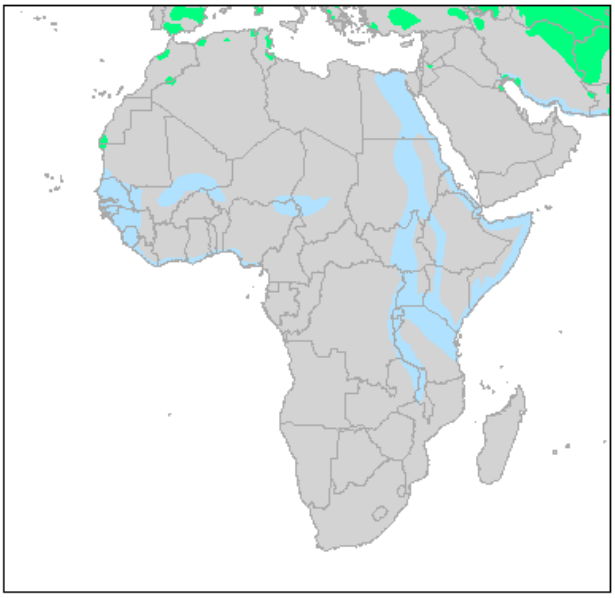


Sooty Tern

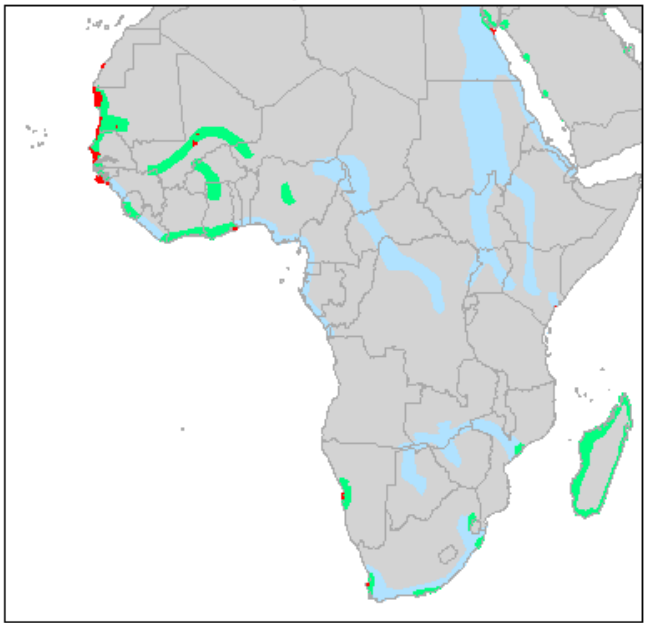
Black Tern



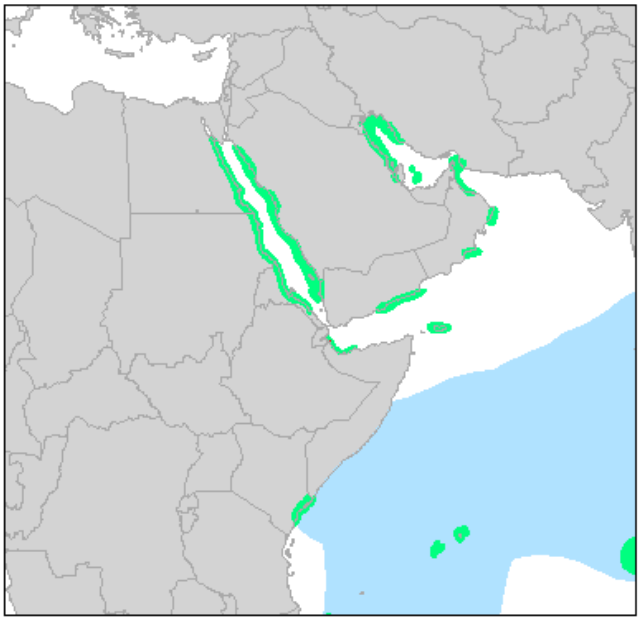
Common Gull-billed Tern



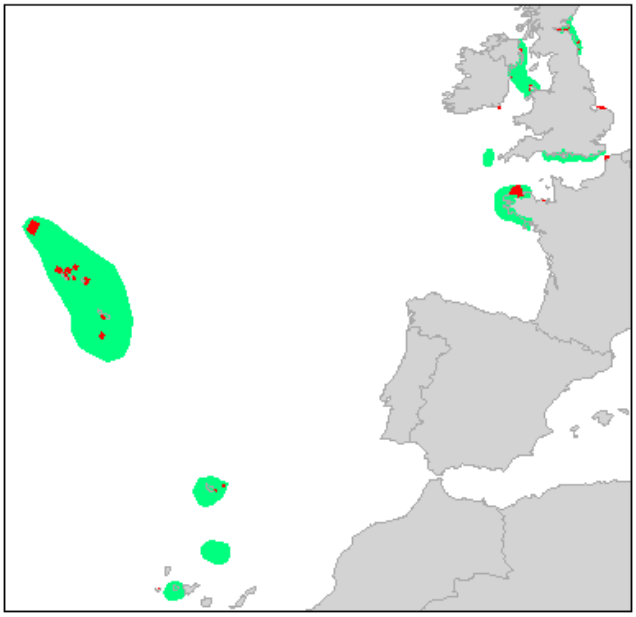
Caspian Tern



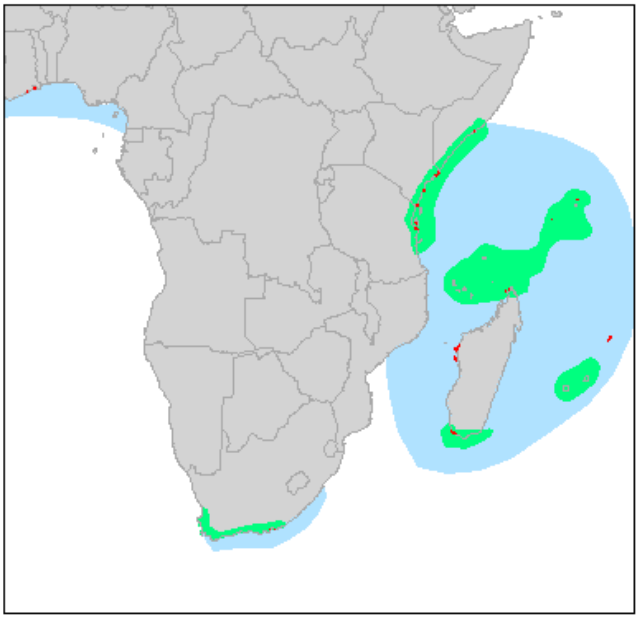
Bridled Tern



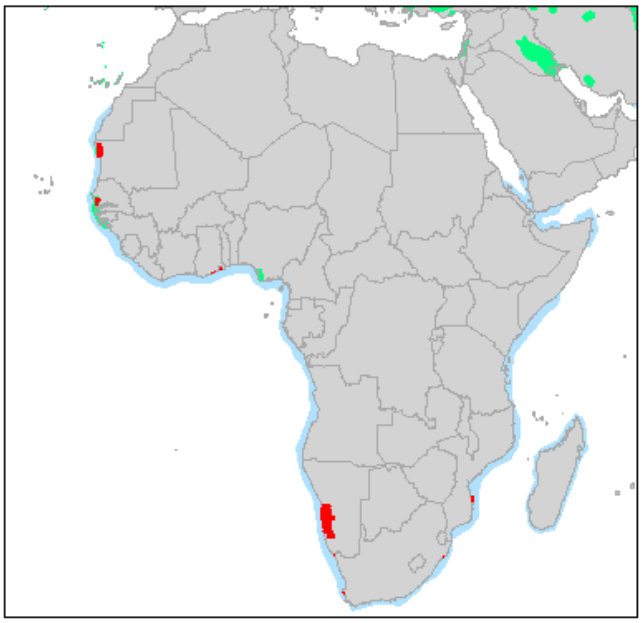
Roseate Tern



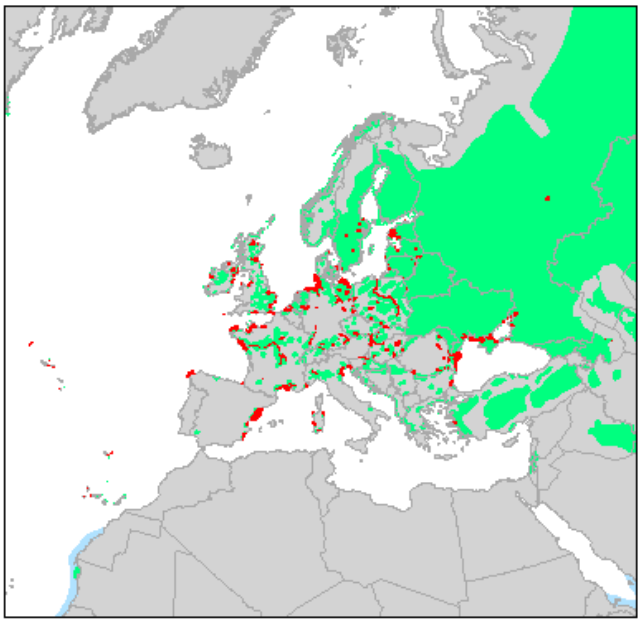
Roseate Tern



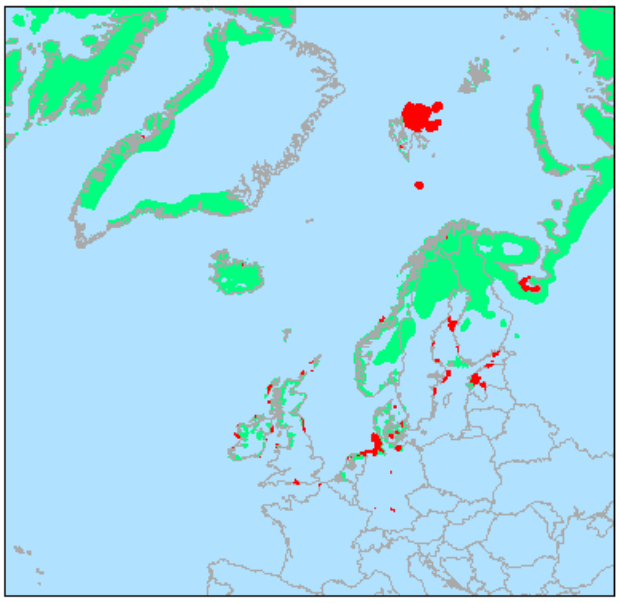
Common Tern



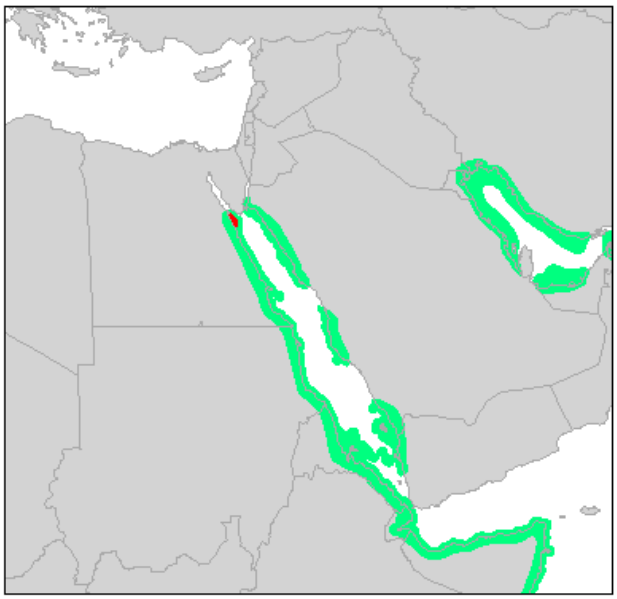
Common Tern



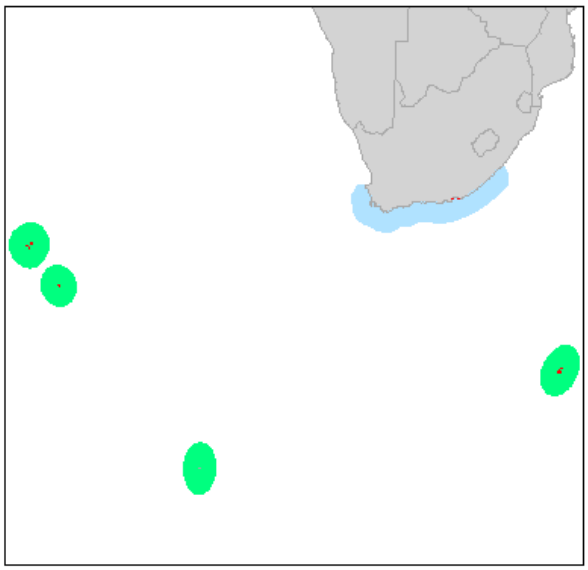
Arctic Tern



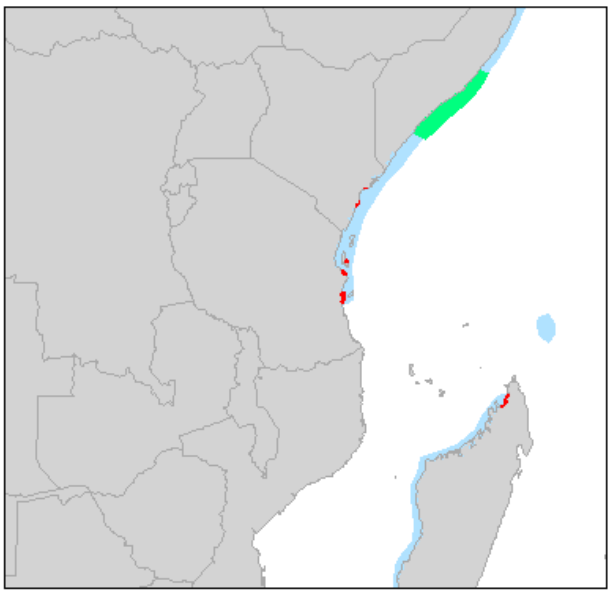
White-cheeked Tern



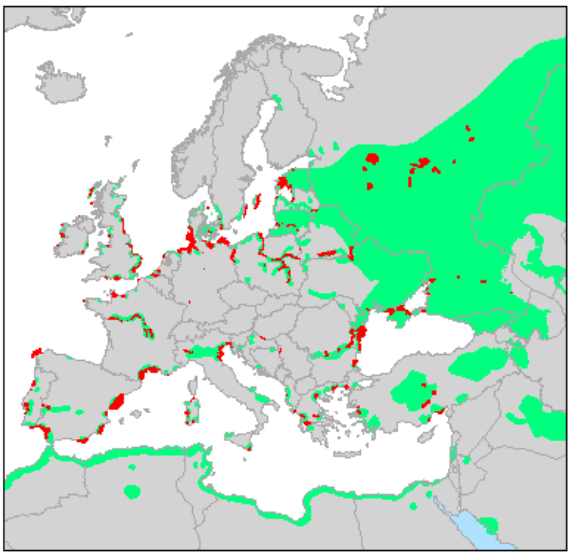
Antarctic Tern



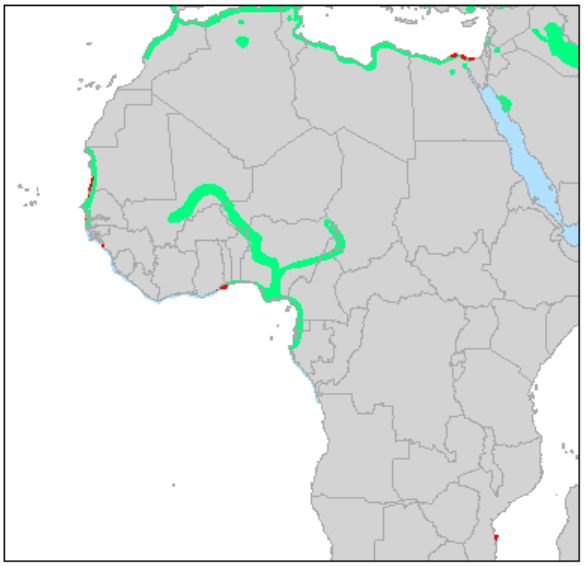
Saunders's Tern



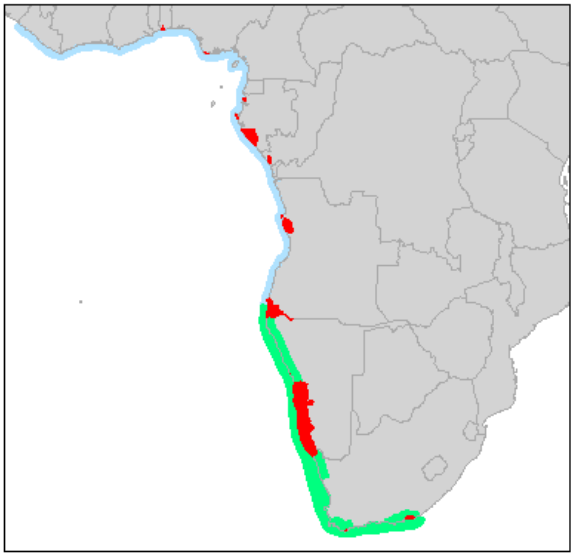
Little Tern



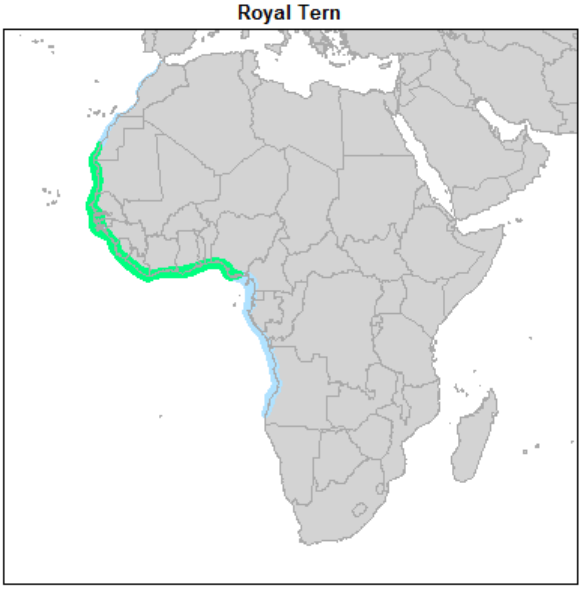
Little Tern



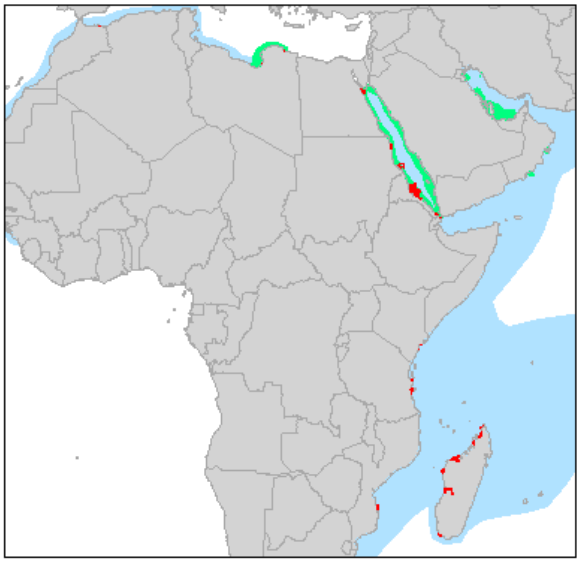
Damara Tern



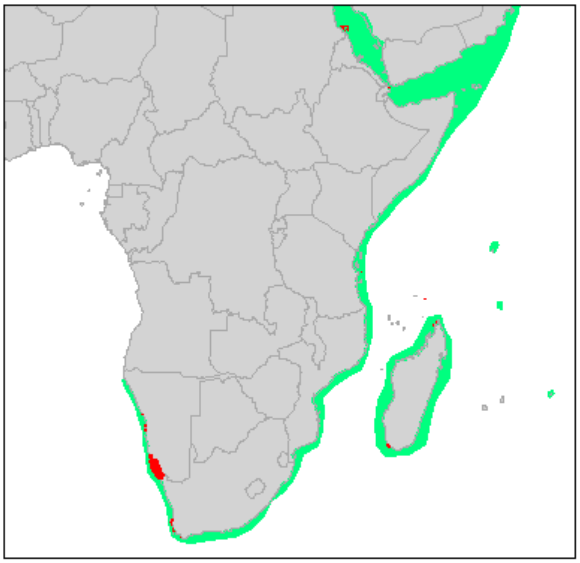
Royal Tern



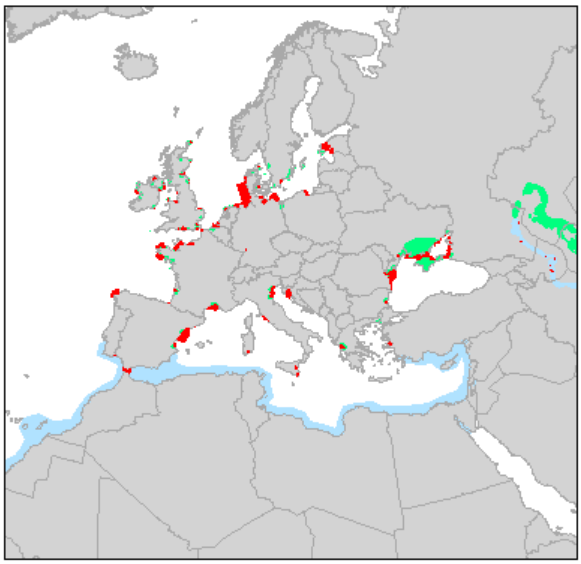
Lesser Crested Tern



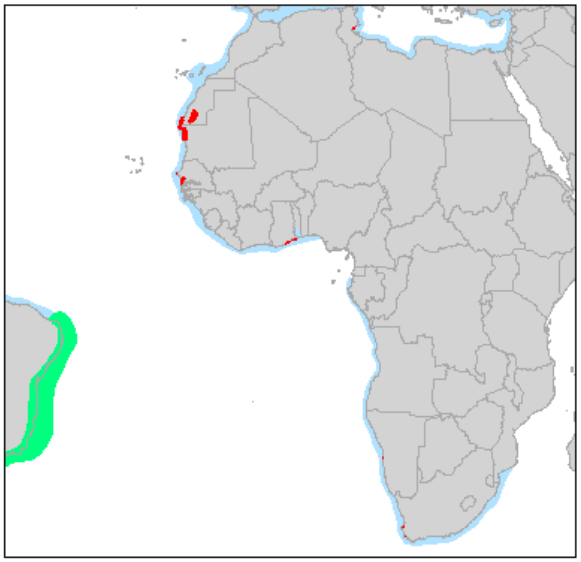
Greater Crested Tern



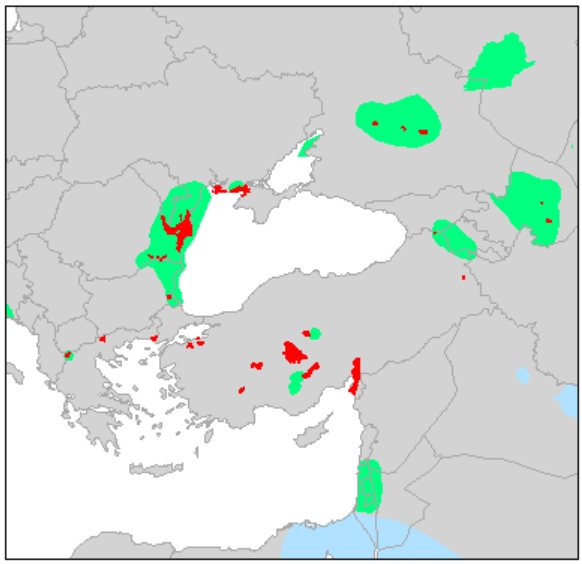
Sandwich Tern



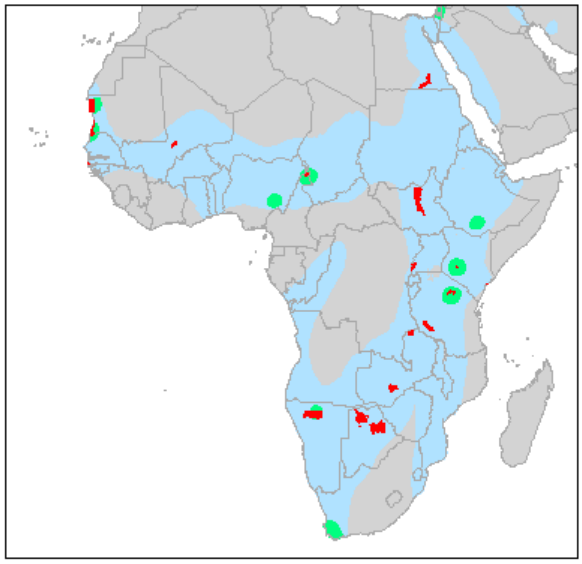
Sandwich Tern



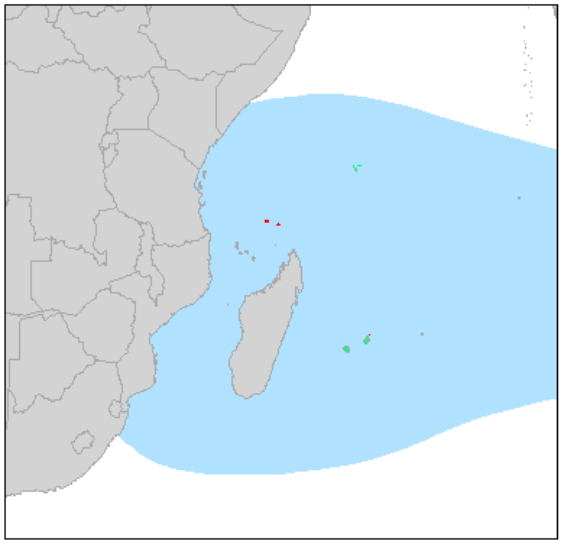
Great White Pelican



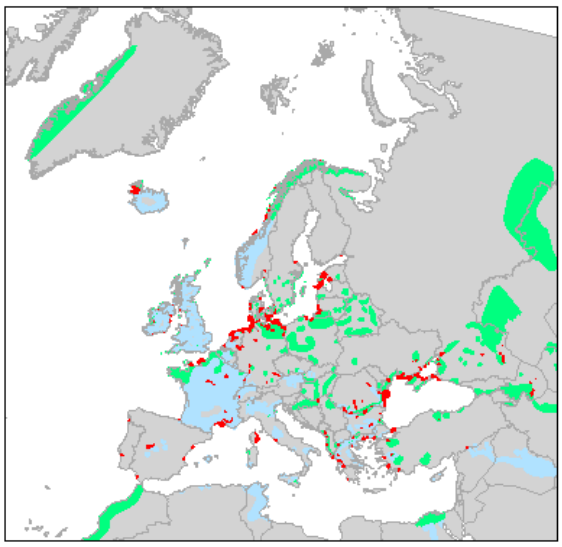
Great White Pelican



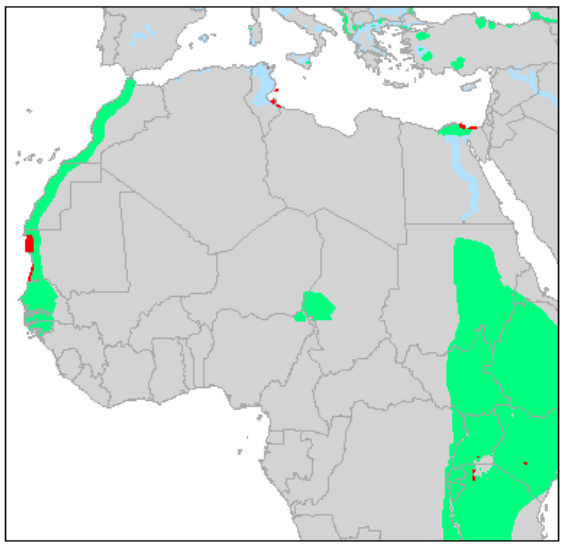
Red-tailed Tropicbird



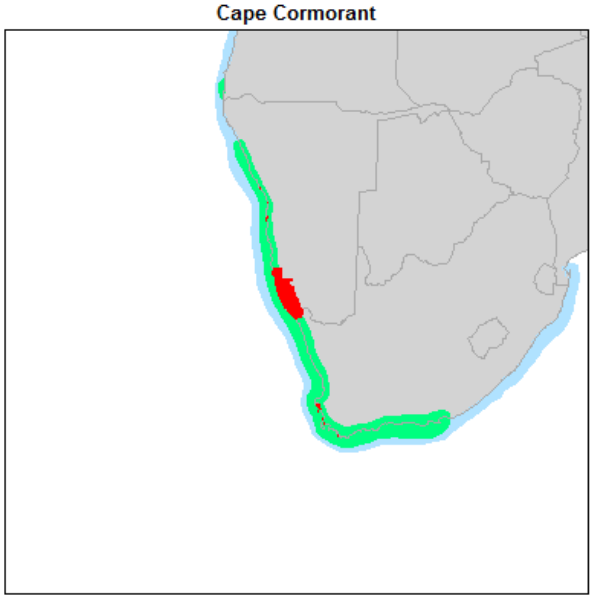
Great Cormorant



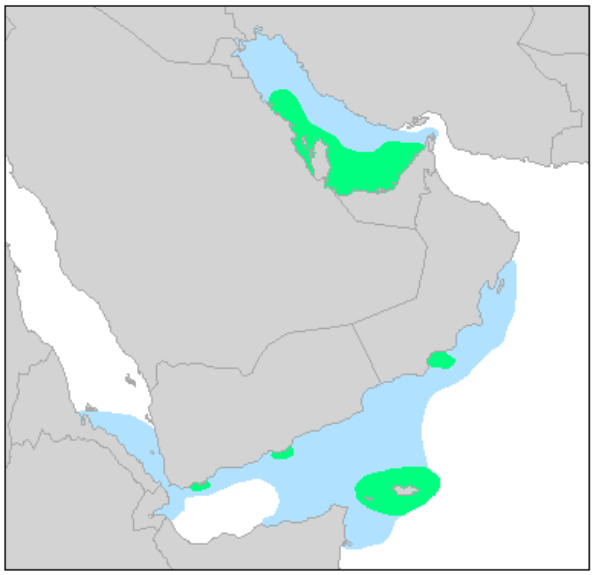
Great Cormorant



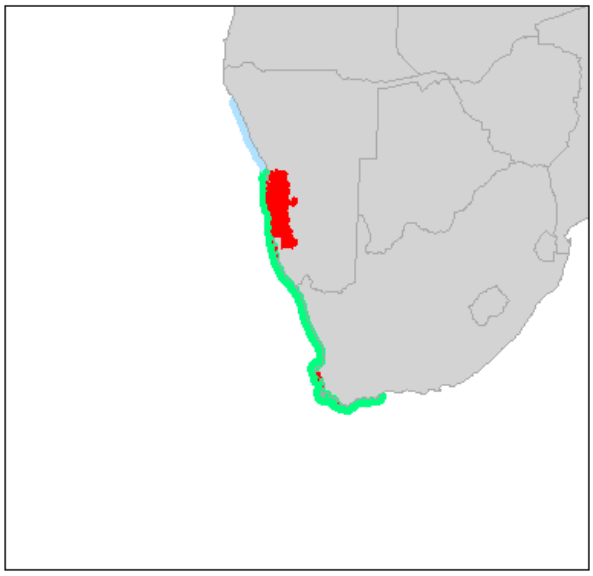
Cape Cormorant



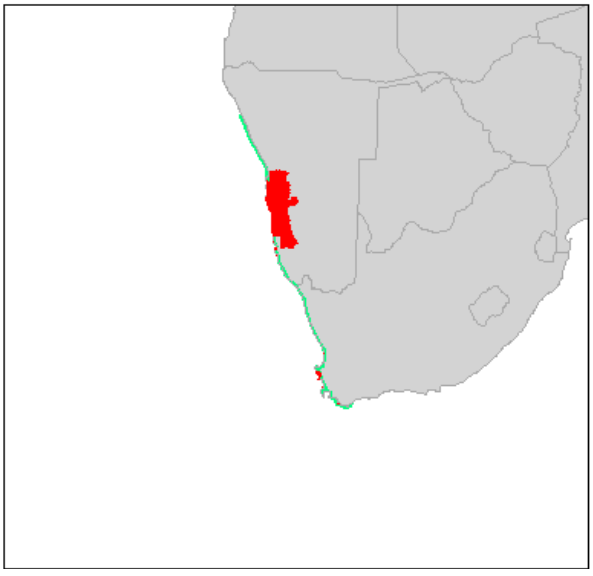
Socotra Cormorant



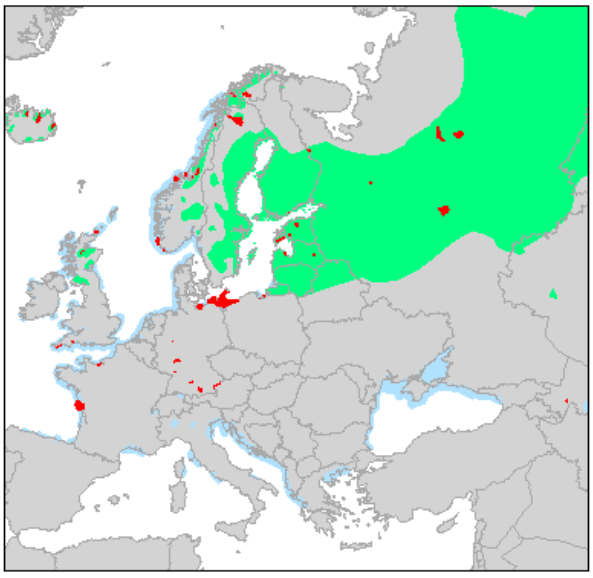
Bank Cormorant



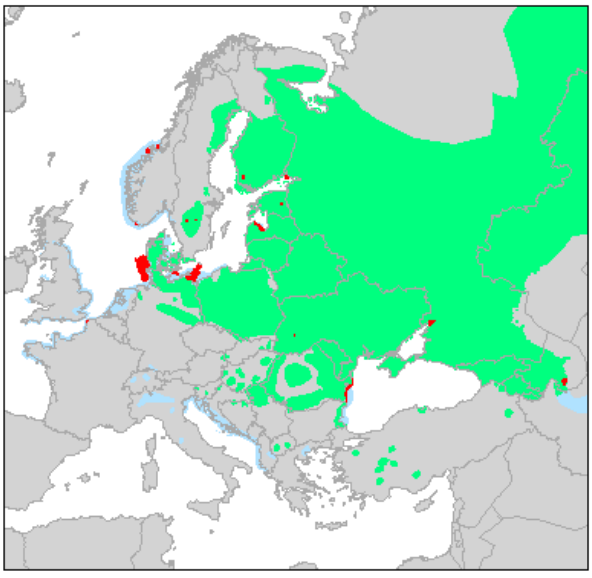
Crowned Cormorant



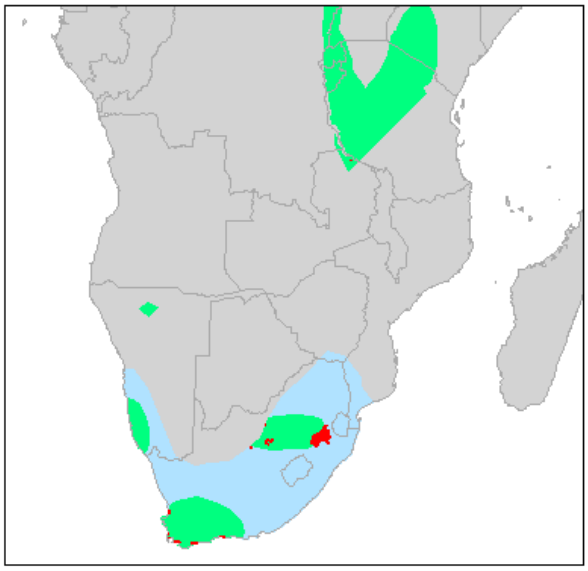
Horned Grebe



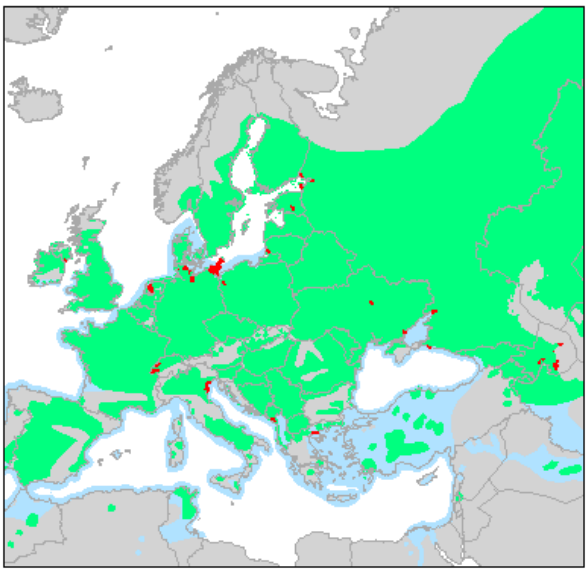
Red-necked Grebe



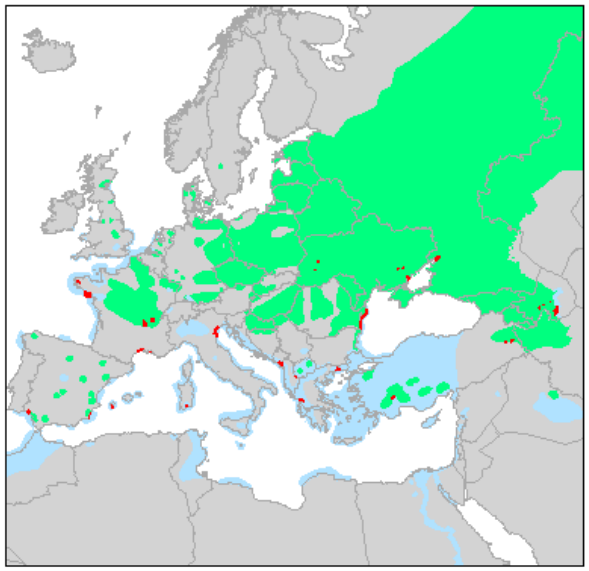
Great Crested Grebe



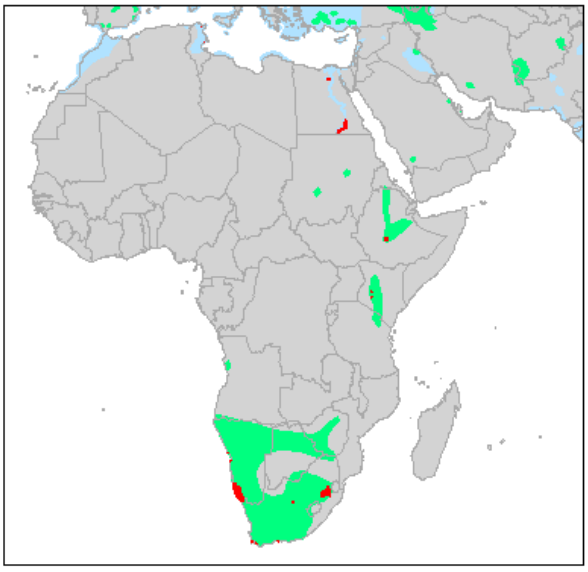
Great Crested Grebe



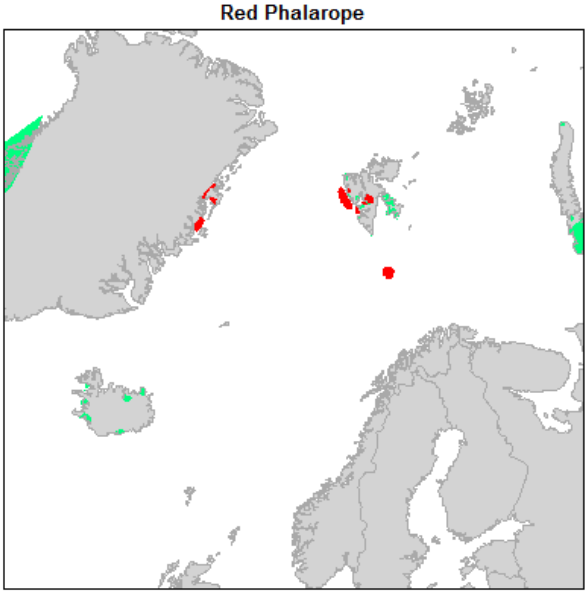
Black-necked Grebe



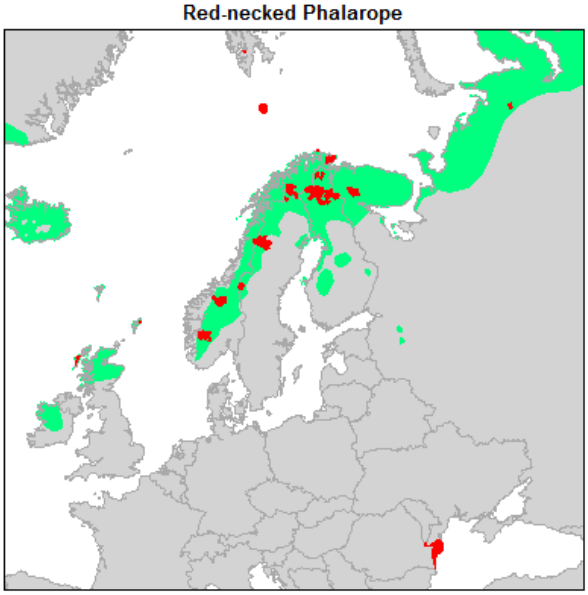
Black-necked Grebe



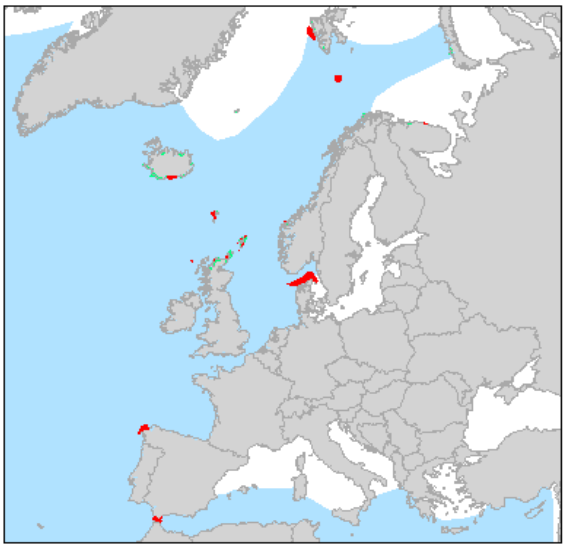
Red Phalarope



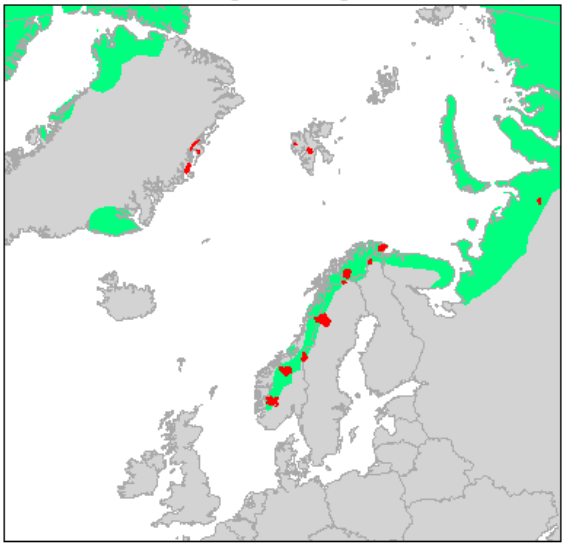
Red-necked Phalarope



Great Skua

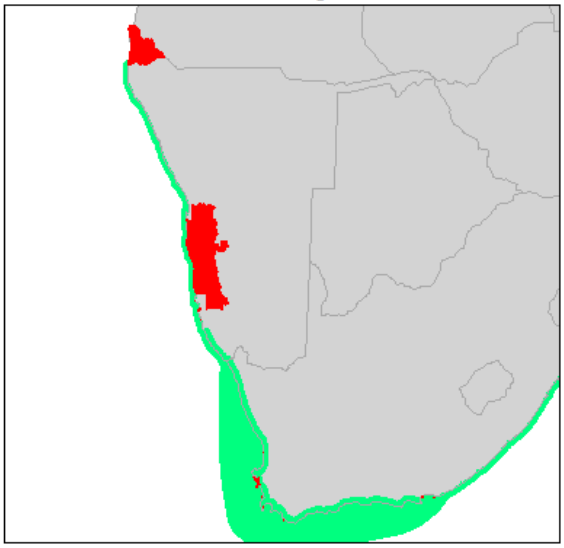


Long-tailed Jaeger

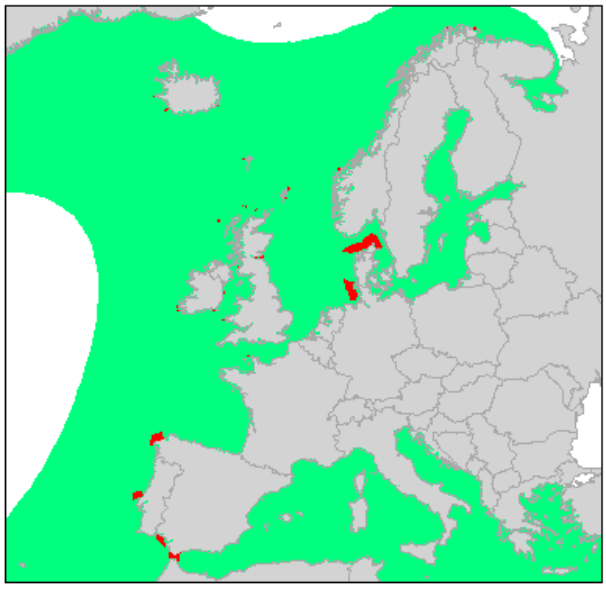


Long-tailed Jaeger

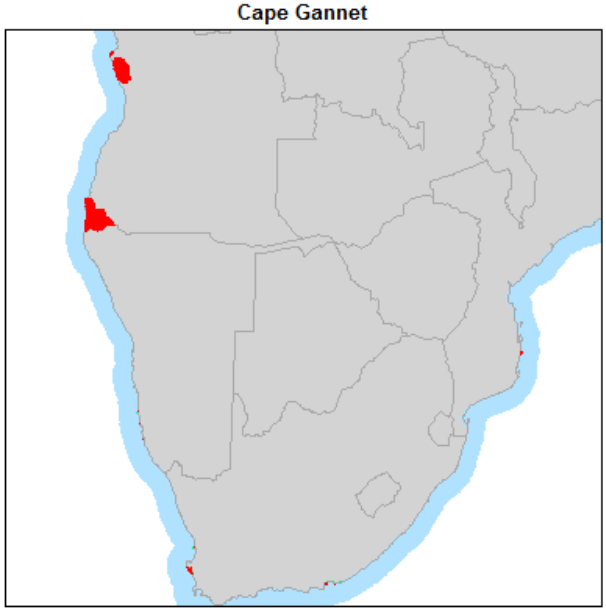
African Penguin



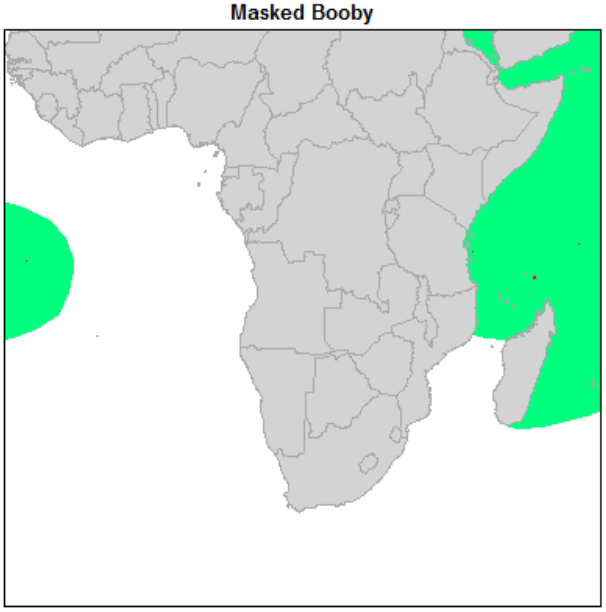
Northern Gannet



Cape Gannet

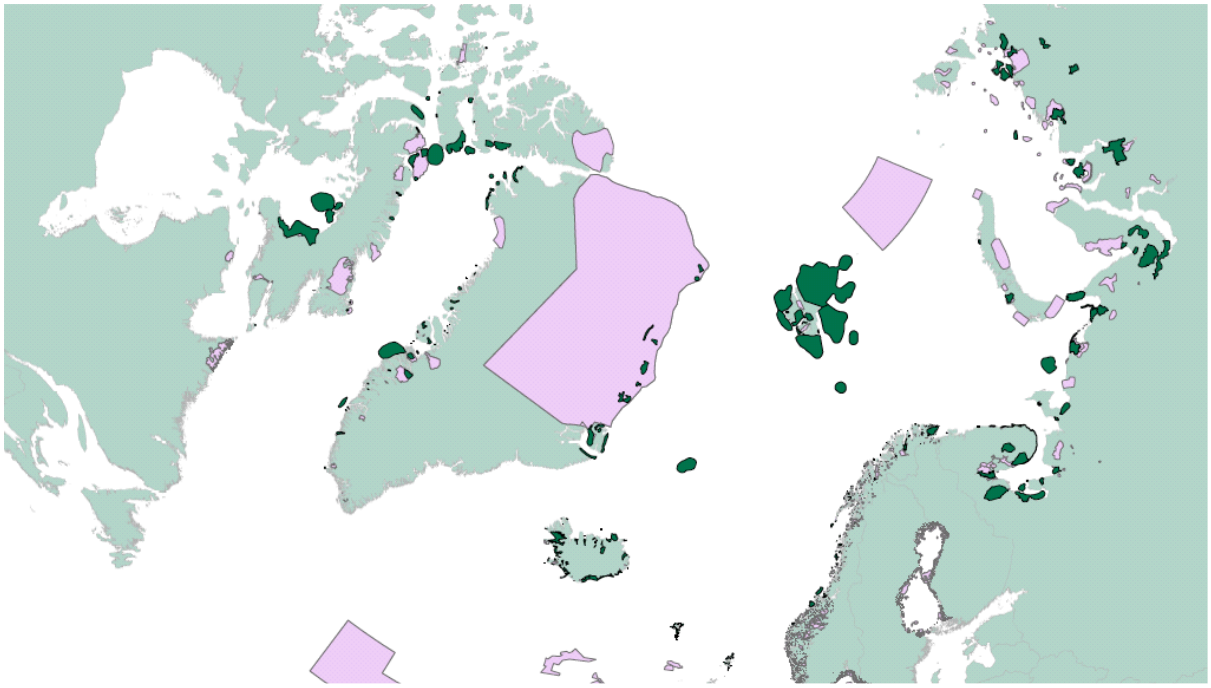


Masked Booby



Appendix III, Marine Protected Areas and marine Important Bird Areas

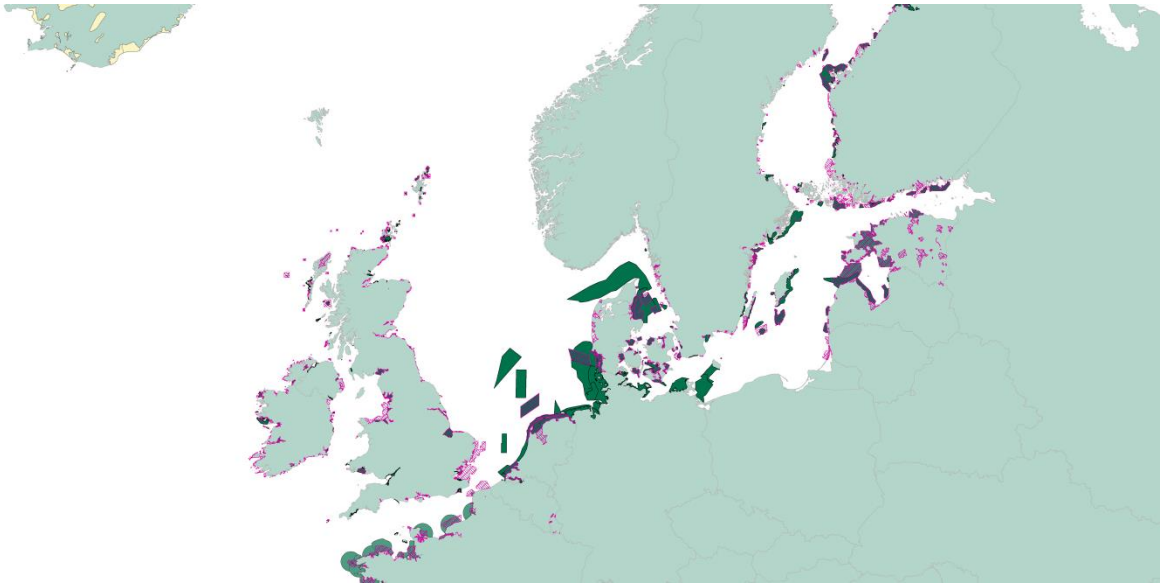
Arctic and sub-Arctic. Marine Important Bird Areas and coastal Important Bird Areas in green and the existing Protected Area network in pink. (Data from BirdLife International World Bird Database and Protected Planet World Database of Protected Areas)



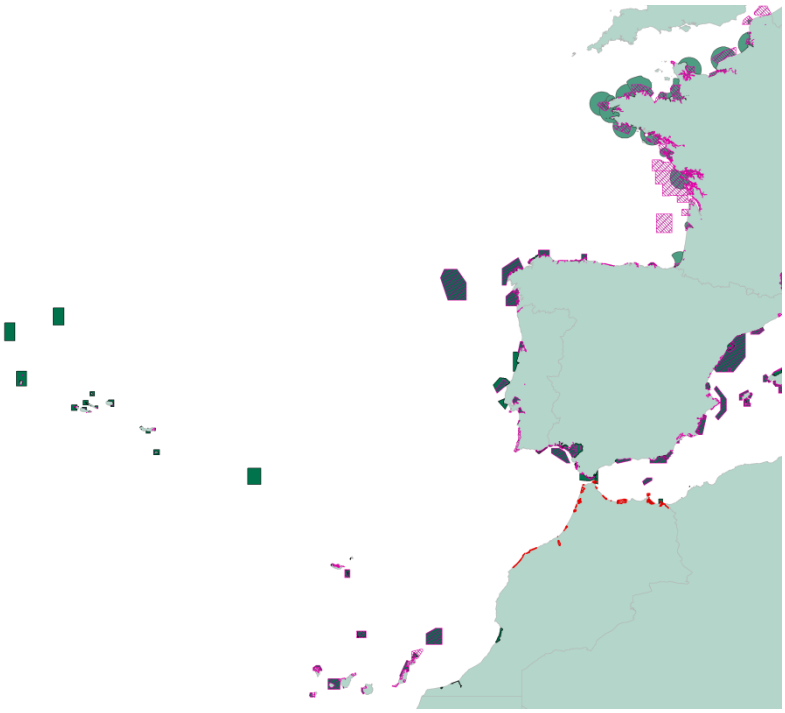
Appendix IV

European region (a-Northern European Seas, b-Lusitanian and c-Mediterranean) Marine Protected Areas (Natura 2000 sites) indicated in pink, Protected Areas outside EU indicated in red. Marine Important Bird Areas indicated in dark green.

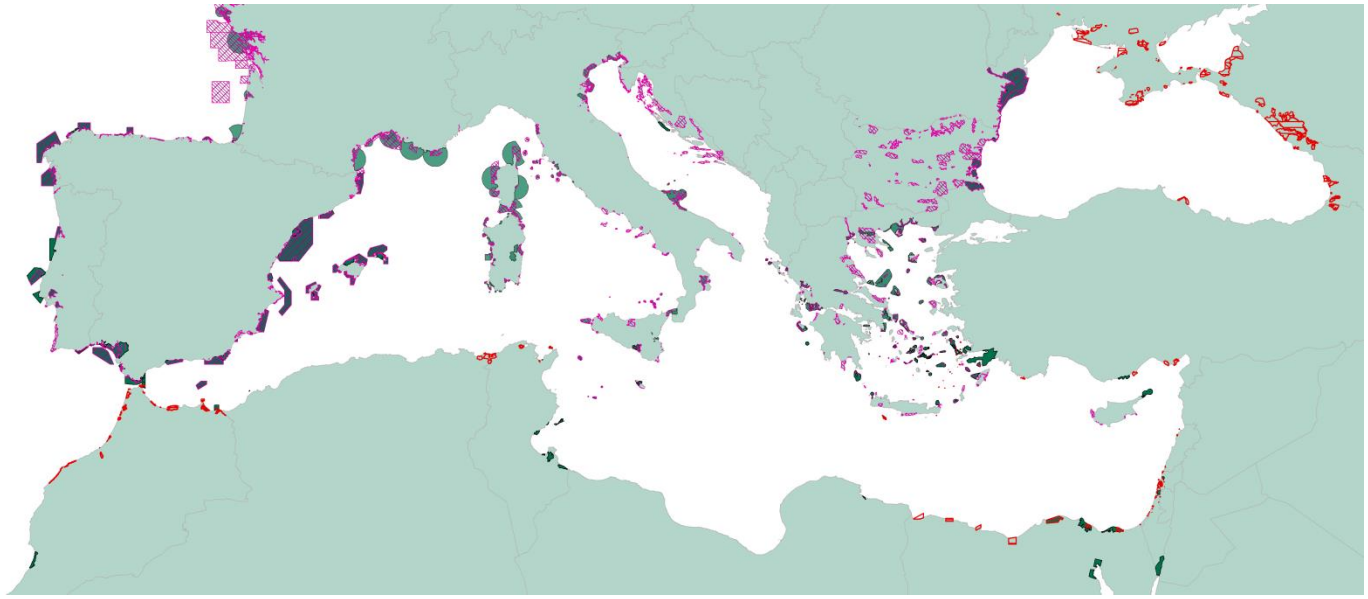
a)



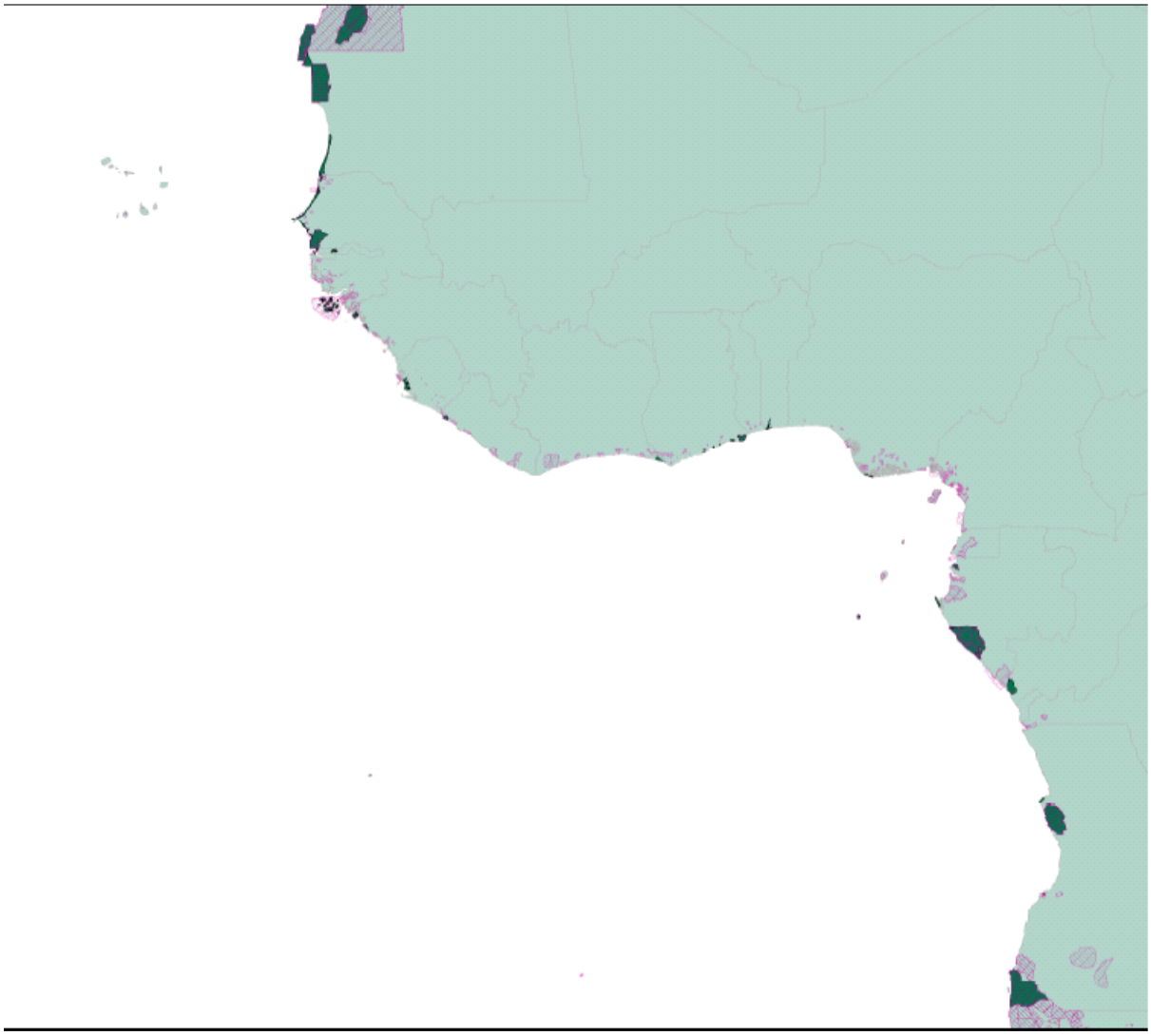
b)



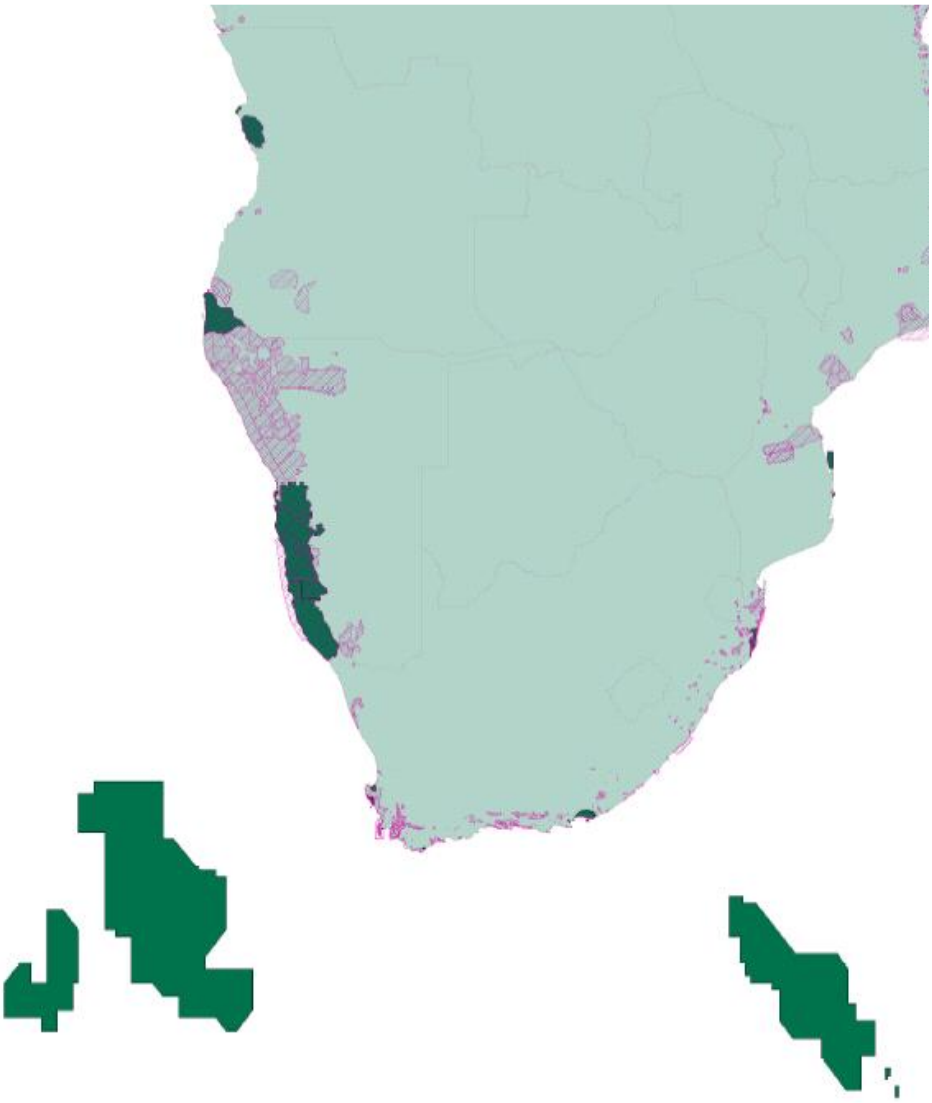
c)



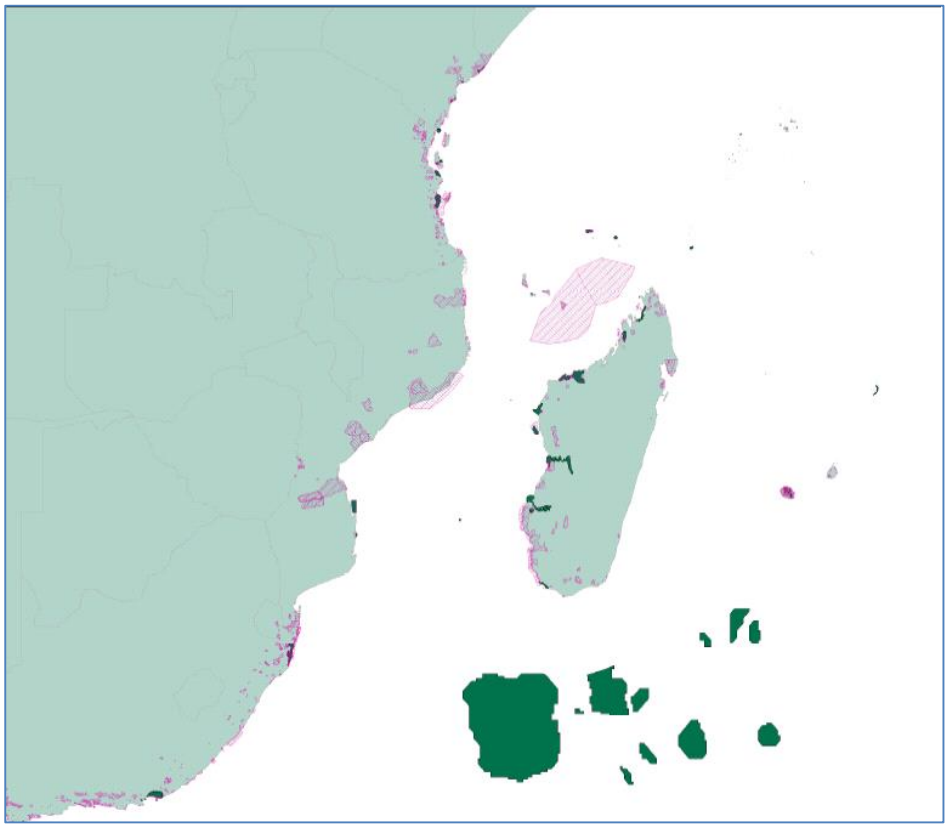
Appendix V- Marine Important Bird Areas in West African Tropical and north-temperate Atlantic and existing Protected Area Network. (Green= marine Important Bird Area, Pink= existing Protected Area network).

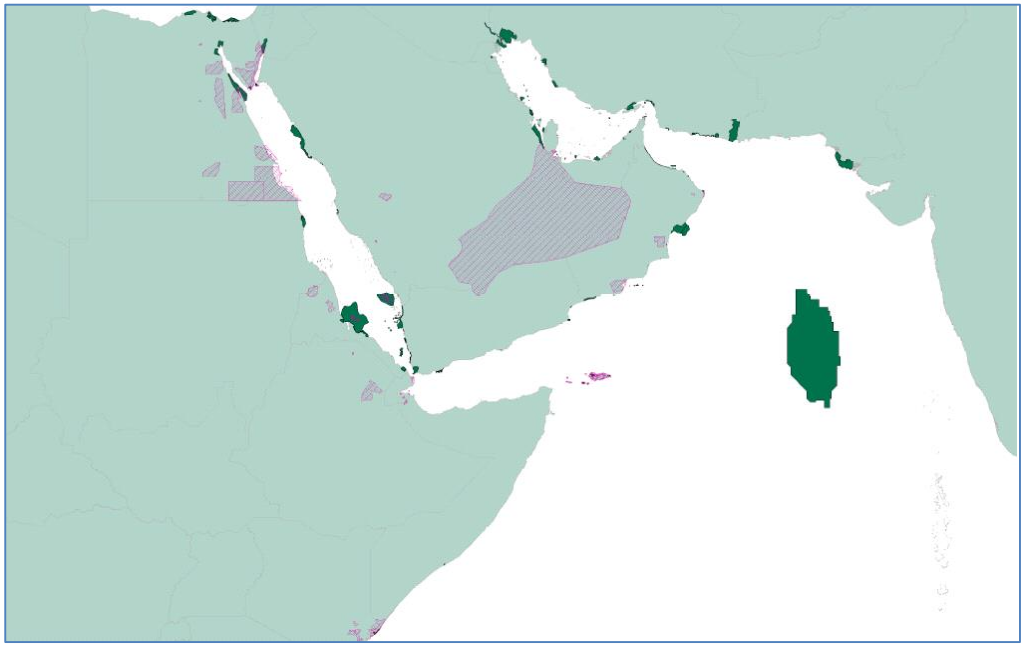


Appendix VI- Marine Important Bird Areas in Temperate Southern Africa and the existing Protected Area network (Green= marine Important Bird Area, Pink= existing Protected Area Network



Appendix VII- Marine Important Bird Areas in East Africa (west Indo-Pacific) and existing Protected Area network. (Green= marine Important Bird Area, Pink= existing Protected Area)





Appendix VIII- Ecologically and Biologically Significant Areas in the Arctic region.

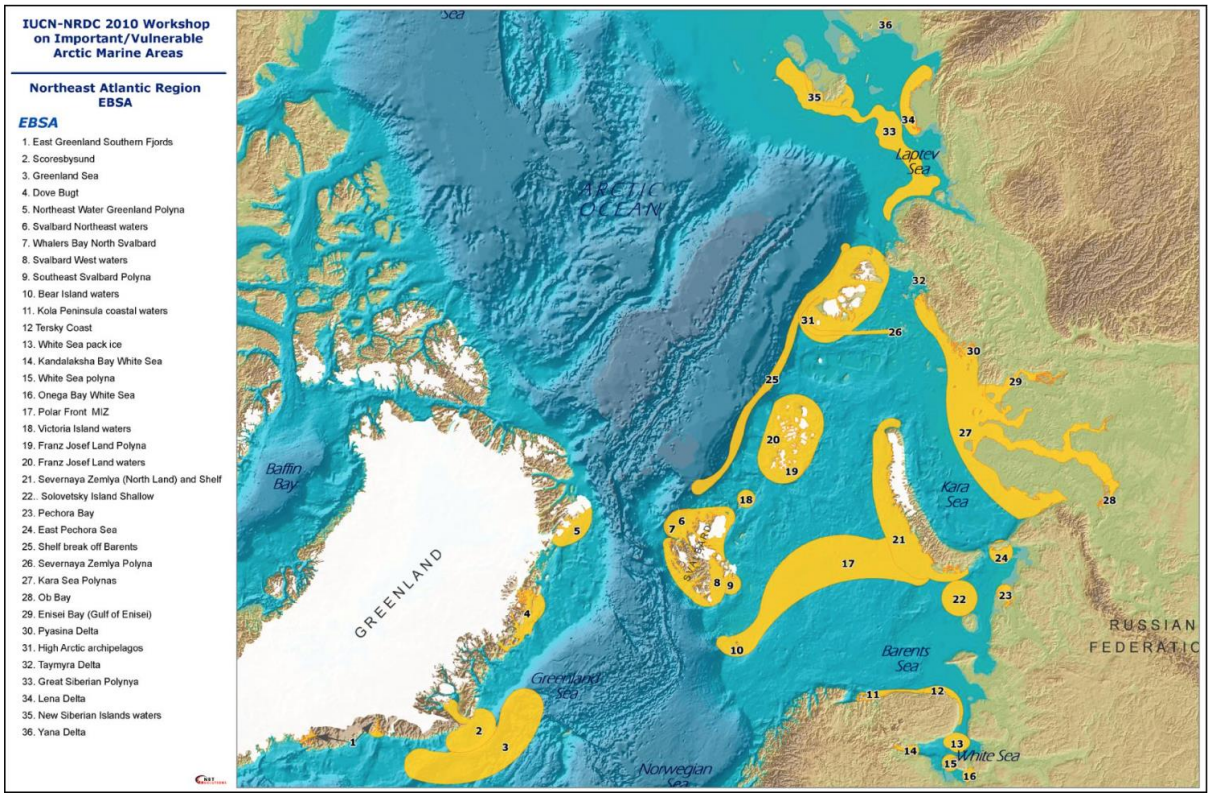


Figure ***, Ecologically and Biologically Significant Areas in North East Atlantic Region (Adapted from CBD Final Workshop Report)

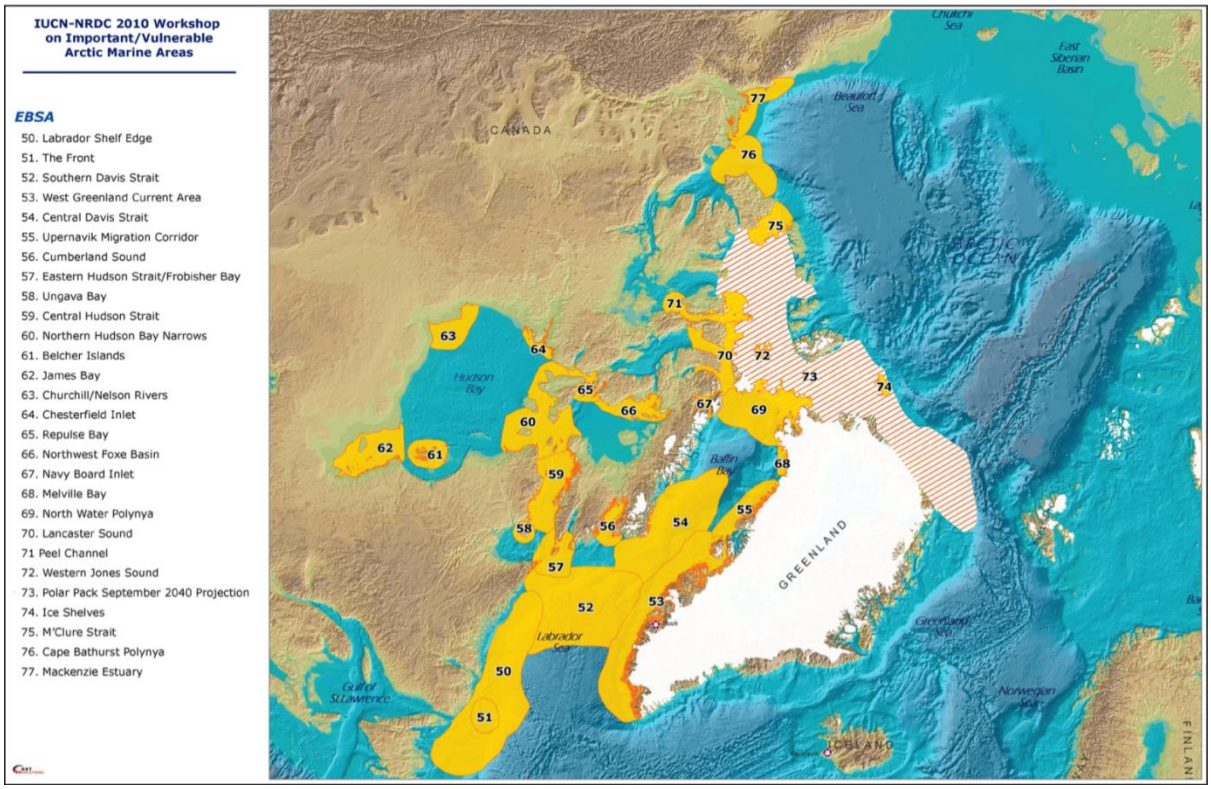
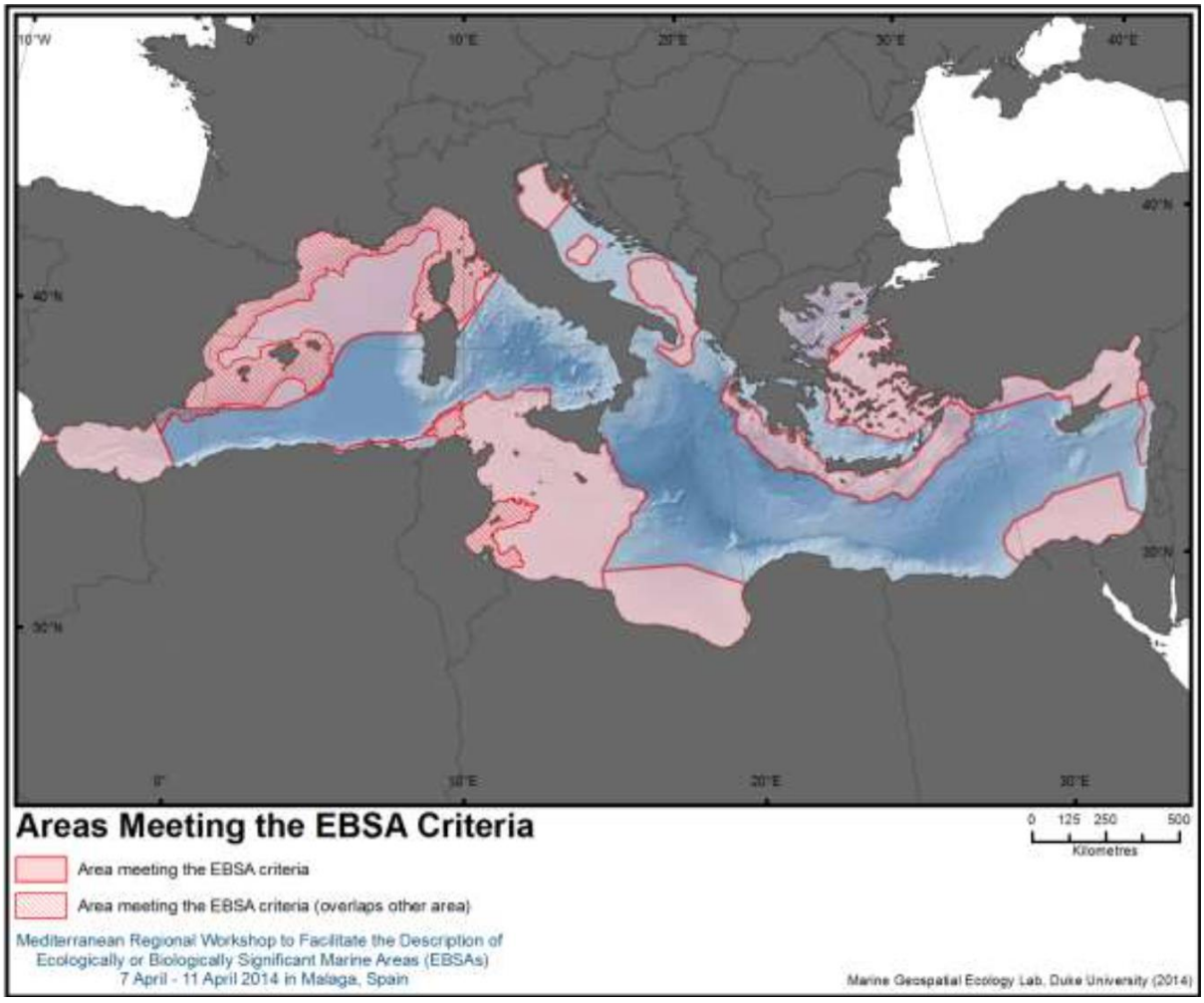


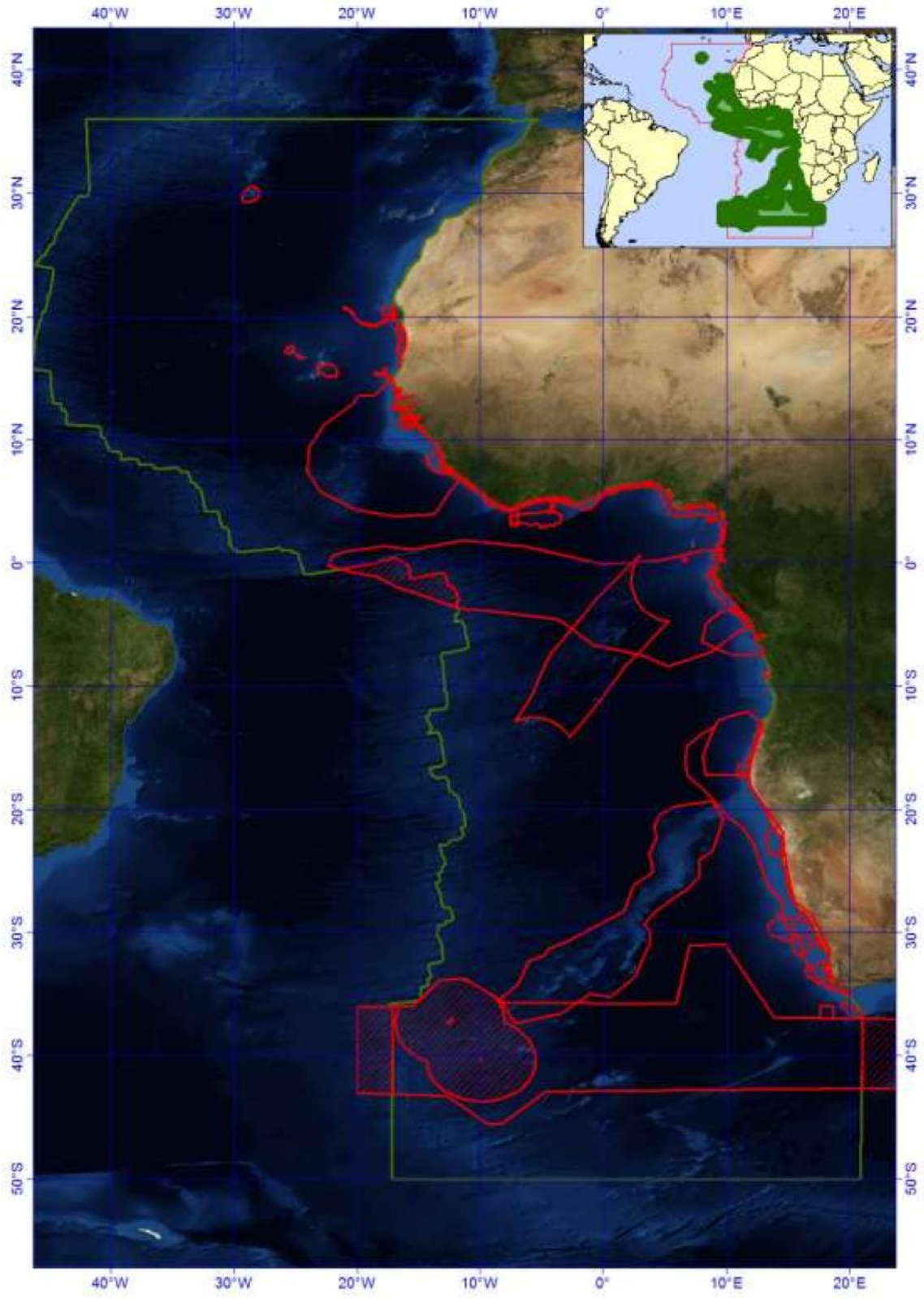
Figure ***, Ecologically and Biologically Significant Areas in North West Atlantic Region (Adapted from CBD Final Workshop Report)

Appendix IX- Ecologically and Biologically Significant Areas, Mediterranean Region



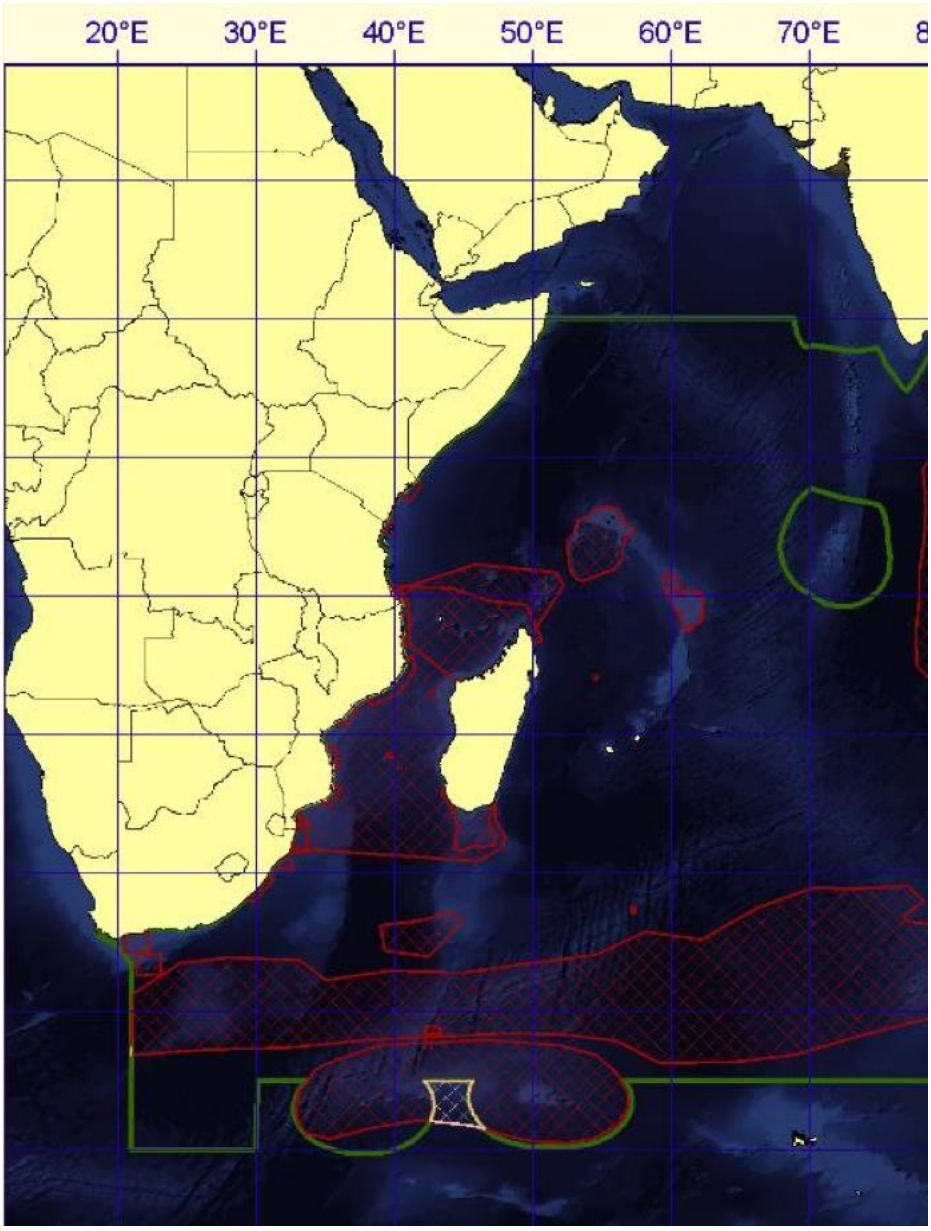
Adapted from the Convention of Biological Diversity Mediterranean EBSA Final Report, available https://www.cbd.int/doc/meetings/mar/ebsaws-2014-03/official/ebsaws-2014-03-04-en.pdf

Appendix X- Ecologically and Biologically Significant Areas identified in the South Eastern Atlantic



Adapted from Convention on Biological Diversity EBSA Final Workshop Report, available https://www.cbd.int/doc/meetings/mar/ebsa-sea-01/official/ebsa-sea-01-04-en.pdf

Appendix XI. Ecologically and Biologically Significant Areas identified in the East African (western Indian Ocean) region



Adapted from Convention on Biological Diversity EBSA Final Workshop Report, available https://www.cbd.int/doc/meetings/mar/ebsa-sio-01/official/ebsa-sio-01-04-en.pdf