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2.1 Icelandic Waters ecoregion – Ecosystem overview

Ecoregion description

The Icelandic Waters ecoregion covers the shelf and surrounding waters inside the Icelandic EEZ. The region is located at the junction of the Mid-Atlantic Ridge and the Greenland–Scotland Ridge just south of the Arctic Circle. The ocean and coastal shelves are heavily influenced by oceanic inputs.

In the Icelandic Waters ecoregion, water masses of different origin mix. Relatively warm and saline Atlantic water enters the area, both in the southwest as a branch of the Irminger Current and in the east from the Norwegian Sea and over the Jan Mayen Ridge (Figure 1). The East Greenland Current carries cold, low salinity water from the Greenland Sea in the north into the Icelandic Waters ecoregion.

The ecoregion is considered to be made up of four key subareas (Figure 1) defined by difference in bathymetry, hydrography, and species composition:

1. Southern shelf: Coastal areas south and west of Iceland (mostly < 500 metres). Mainly a mixture of coastal and Atlantic waters.
2. Northern shelf: Banks north and east of Iceland (mostly < 500 metres). Mainly a mixture of coastal, Atlantic, and Arctic waters.
3. Southern deep: Off the shelf south and west of Iceland (mostly > 500 metres). Mainly Atlantic water.
4. Northern Deep: Off the shelf north and east of Iceland (mostly > 500 metres). Mainly Arctic water.

The ecoregion lies within the Icelandic EEZ and the fisheries are mainly managed by the Icelandic Government, with the fisheries of some stocks being managed by NEAFC and by coastal state agreements. Environmental policy is managed by national agencies, with advice being provided by national agencies, OSPAR, and ICES. The International Whaling Commission (IWC) has regulations for the conservation and harvest of whales. Marine mammal issues are also considered in cooperation with the North Atlantic Marine Mammal Commission (NAMMCO).

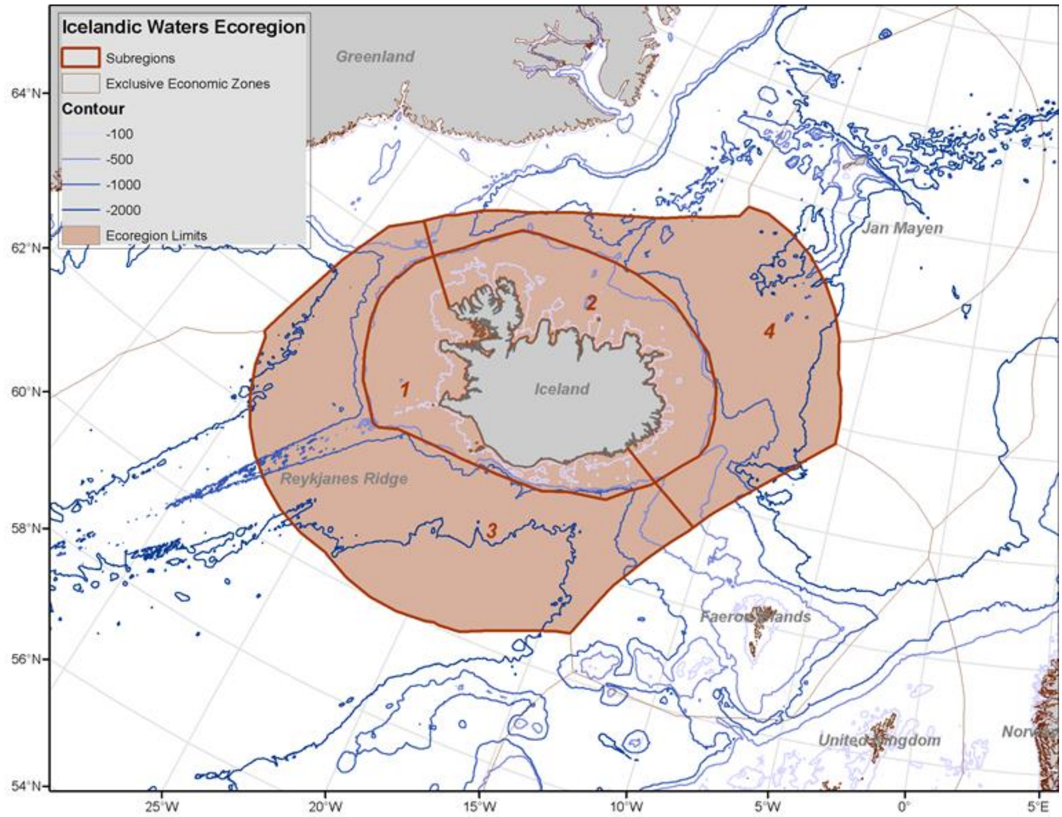

Figure 1 The Icelandic Waters ecoregion, showing EEZs, subareas, and depth contours.

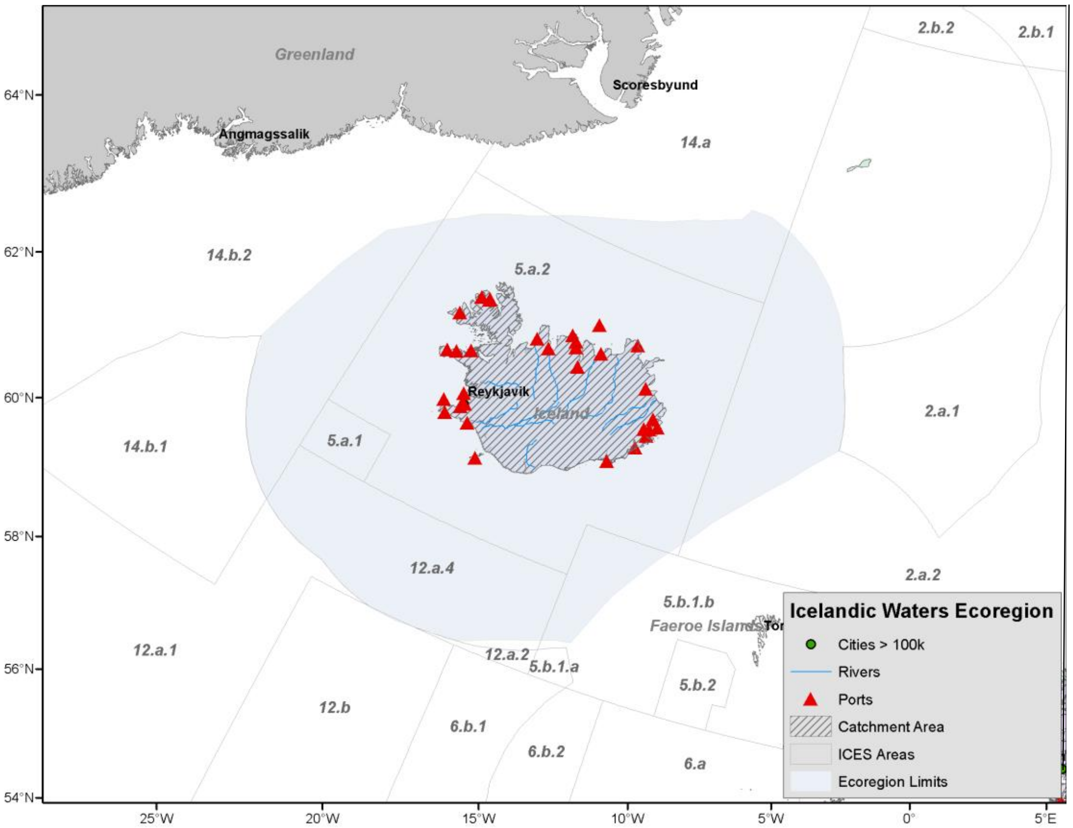

Figure 2 Catchment area for the Icelandic Waters ecoregion, showing major cities, ports, and ICES areas.

Key signals within the environment and the ecosystem

- The variable location of the fronts between the colder and fresher waters of Arctic origin and the warmer and more saline waters of Atlantic origin result in variable local conditions, especially on the northern part of the shelf. During the last two decades, the Atlantic water mass has been dominating, in contrast to the Arctic domination in the previous three decades.
- Zooplankton biomass on the northern shelf has fluctuated in the past, cycling on a five- to ten-year periodicity, with a period of generally low biomass from the 1960s to the 1990s.
- From the mid-2000s, Atlantic mackerel *Scomber scombrus* extended its feeding grounds from the Norwegian Sea to Icelandic Waters ecoregion, while the summer feeding grounds of capelin *Mallotus villosus* moved westwards from Icelandic into Greenland waters. Norwegian spring-spawning herring *Clupea harengus* has, since the early 2000s, reappeared at its traditional feeding grounds east and north of Iceland. These major changes in migration patterns have been linked to prey availability, oceanographic conditions, and stock density.
- Increased temperature in the lower water column on the western and northern part of the Icelandic shelf has resulted in changes in spatial distribution for a number of demersal species. Species like haddock *Melanogrammus aeglefinus*, anglerfish *Lophius piscatorius*, ling *Molva molva,* tusk *Brosme brosme*, dab *Limanda limanda*, and witch *Glyptocephalus cynoglossus* that have previously had Icelandic waters as their northern boundary of distribution and have mainly been recorded in the warm waters south and west of Iceland, are now showing a northward clockwise trend in their distribution along the shelf, and in some cases a distributional shift. Warming waters has led to a decline in the stock abundance and distribution of many cold-water species, while the previously rare occurrence of warm-water species in the ecoregion has increased in recent years.
- The stocks of northern shrimp *Pandalus borealis* collapsed around the year 2000 and the driving factors are thought to be increased predation by gadoids, increasing temperature, and high fishing mortality.
- Improved management measures for most of the major stocks (cod *Gadus morhua*, haddock, saithe *Pollachius virens*, redfish *Sebastes* sp., herring) have resulted in decreased fishing mortality, close to or at F_{MSY}, and increased SSBs. This has furthermore resulted in decrease in effort and less pressure on the benthic habitats.
- A recruitment failure of sandeel (Ammodytidae) was recorded in 2005 and 2006, and, with the exception of the 2007 cohort, recruitment has been at a low level since then. Fish stomach content data suggest that the decline in the sandeel population may even have started as early as around year 2000.
- The abundance of minke whales *Balaenoptera acutorostrata* has decreased on the Icelandic shelf in recent years, following changes in prey distribution. Abundance of other species, in particular fin whales *Balaenoptera physalus* and humpback whales *Megaptera novaeangliae*, have increased over the last 20 to 30 years.
- In recent decades, the breeding success of many seabird species has been poor in south and west Iceland, accompanied by declines in their breeding population sizes. These trends may be influenced by changes in density, composition, and spatial distribution of their main fish prey (i.e. sandeel).

Pressures

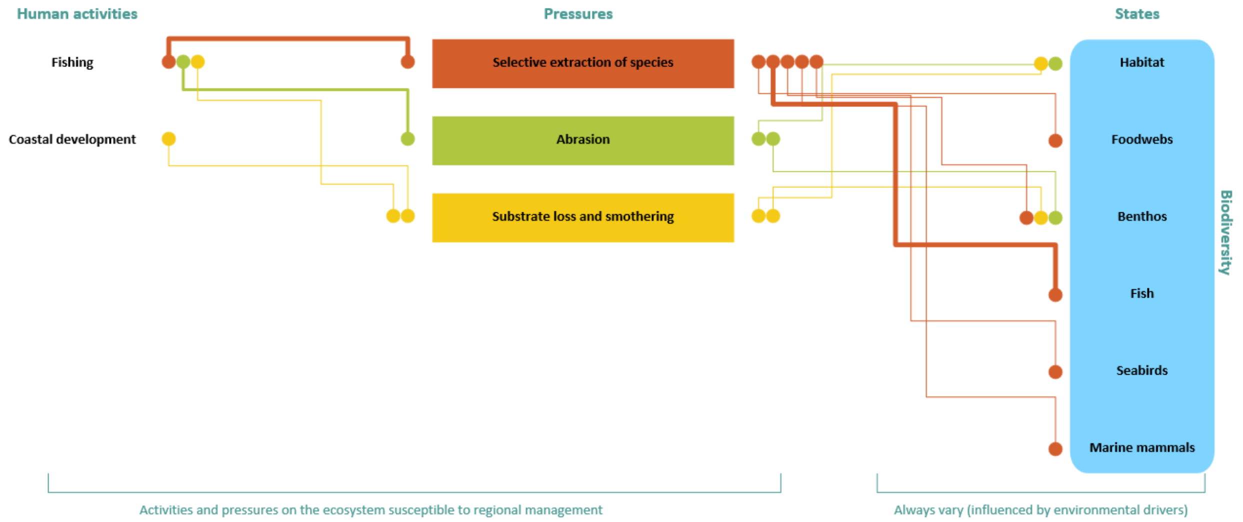

Figure 3 Icelandic Waters ecoregion overview with the major regional pressures, human activities, and state of the ecosystem components. The width of lines indicates the relative importance of individual links (the scaled strength of pressures should be understood as a relevant strength between the human activities listed and not as an assessment of the actual pressure on the ecosystem).

Selective extraction of species (including non-target species)

The bulk of the fisheries, both pelagic and demersal, occurs at depths less than 500 m. There has been an overall reduction since 2005 in fishing effort for fisheries using trawl, longline, gillnet, seine and Danish seine, but an increase in the effort for pelagic trawl and jiggers (Figure 4).

Egg collection and hunting of seabirds takes place mainly in the northwestern and southern parts of Iceland. These activities have decreased to very low levels compared to the period 1900–1940. The culling of seals, introduced in the early 1980s to reduce infestation of seal worm in demersal fish, ended for harbour seals *Phoca vitulina* in the 1990s and for grey seals *Halichoerus grypus* in the early 2000s. This resulted in a decline in the seal populations, with no increase in abundance in recent years. Commercial whaling started again in 2006 with an annual TAC of 154 fin whales and 229 minke whales. No fin whales have been caught since 2015, and annual catches of minke whales have varied from 25 to 81 animals since 2006.

The majority of the fishery in the Icelandic Waters ecoregion is performed by Icelandic vessels, with only a small proportion of the catch taken by others through Iceland's bilateral agreements with neighbouring countries.

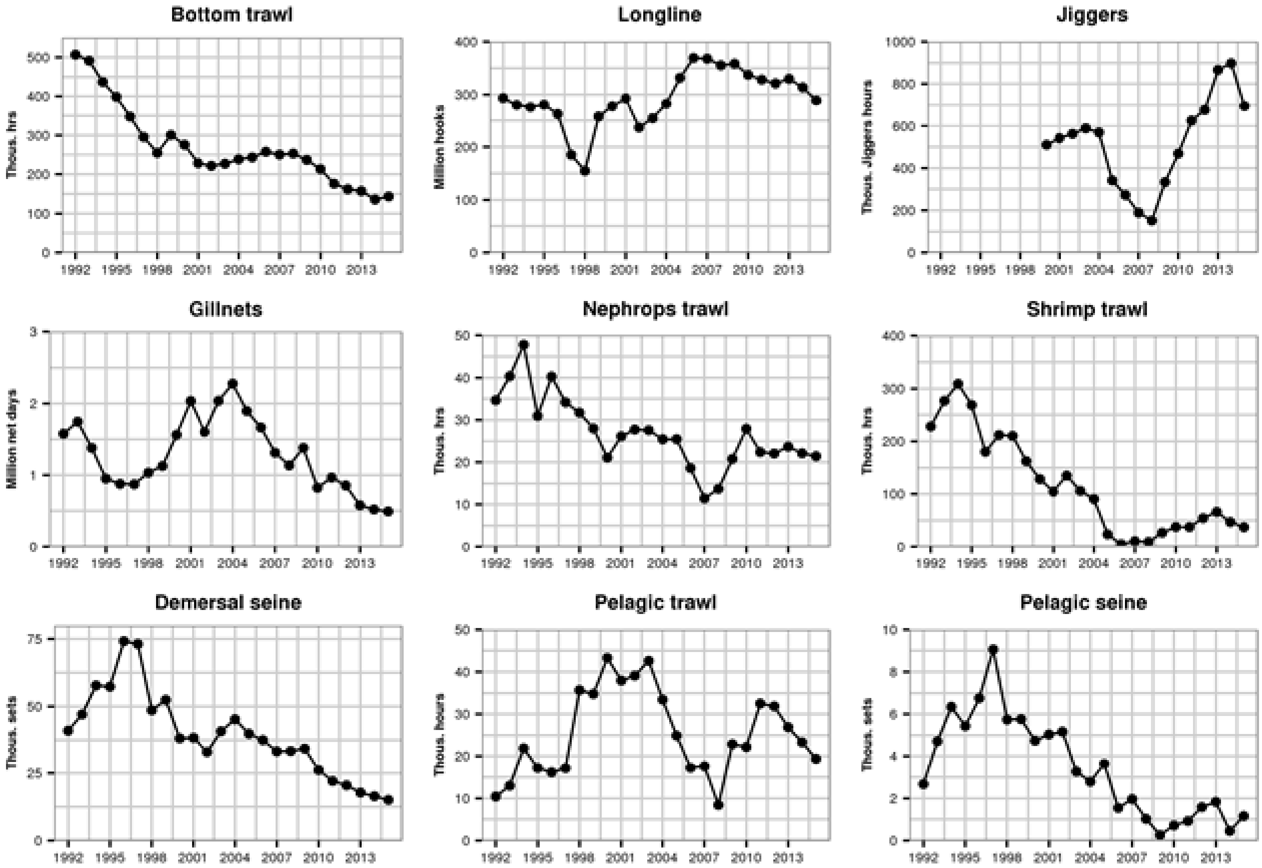

Figure 4 Temporal trends in effort by gear since 1992, based on logbook entries.

The gadoid stocks, along with several others, are assessed by analytical methods, whereas assessments of flatfish species are mainly based on survey indices and landings. For stocks with an analytical assessment and defined reference points, the exploitation rate (fishing mortality [F] and/or harvest rate [HR]) has declined in recent years and is now at F_{MSY} or HR_{MSY} (Figure 5), and the spawning-stock biomass is in all cases above $B_{trigger}$ (Figure 10).

In general, the trends in HR_{proxy} (catch/survey biomass) for gadoids and for 'other species' (redfish, tusk, ling, and wolffish *Anarhichas lupus*) show the same trend as in Figure 5, i.e. the HR_{proxy} is currently at a low value (Figure 6). For the flatfish species the HR_{proxy} has fallen drastically from the period 1995 to 2000, mainly owing to the directed commercial fishery for dab and long rough dab *Hippoglossoides platessoides* having largely ceased.

The pelagic fish stocks are also assessed by analytical methods, except for capelin which is assessed and managed on the basis of acoustic measurements and escapement strategy. The fishing trends for the highly migratory stocks, mackerel, blue whiting *Micromesistius poutassou*, and Norwegian spring-spawning herring, are presented in the ecosystem overview for the Norwegian Sea ecoregion.

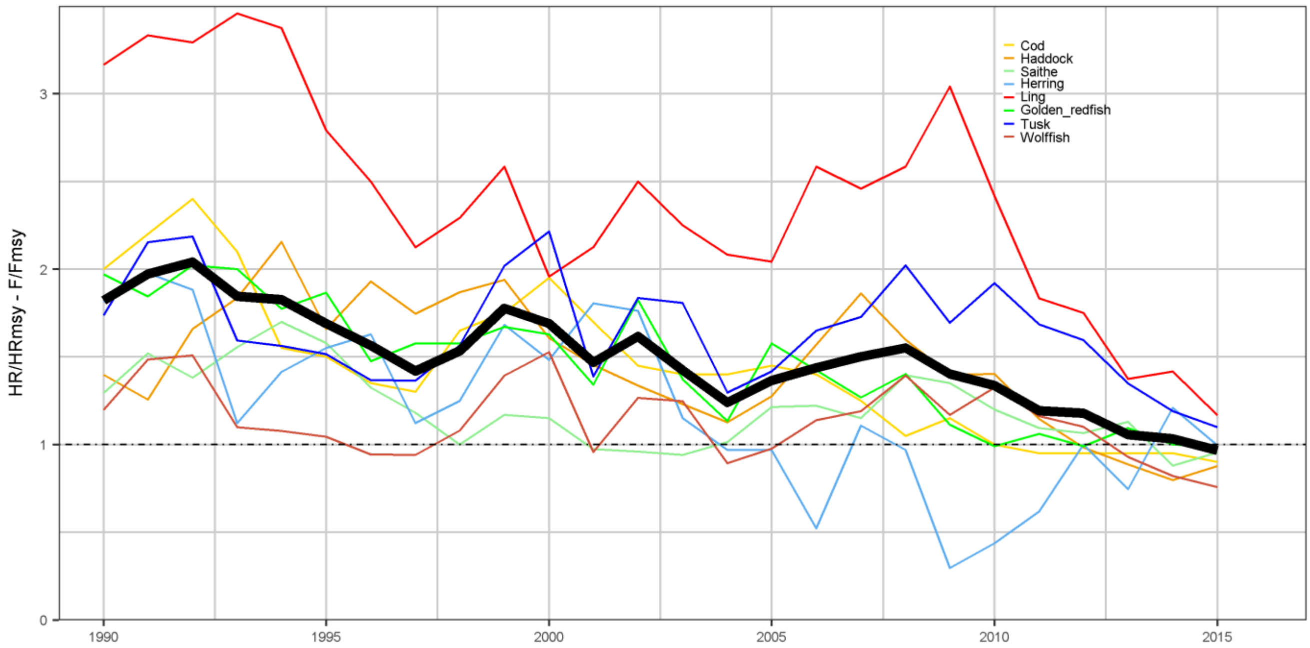

Figure 5 Relative fishing mortality (F to F_{MSY} or HR to HR_{MSY} ratios) for cod, haddock, saithe, herring, ling, golden redfish (*Sebastes norvegicus*), tusk, and Atlantic wolffish. The dotted line denotes F_{MSY} / HR_{MSY}.

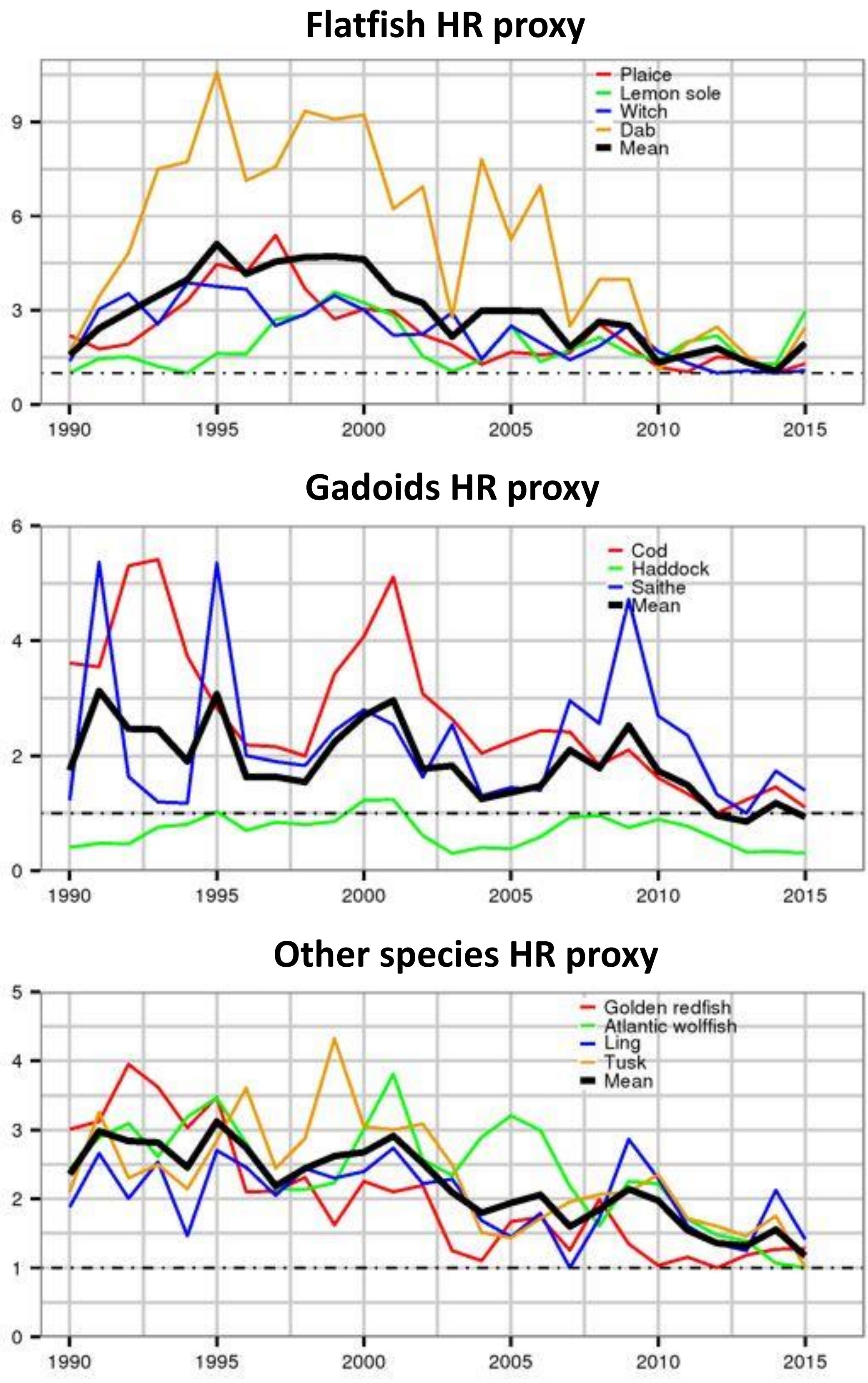

Figure 6 Trends in HR_{proxy} (catch/survey biomass) for plaice *Pleuronectes platessa*, lemon sole *Microstomus kitt*, witch, dab, cod, haddock, saithe, golden redfish, Atlantic wolffish, ling, and tusk. Please note that the average line (dashed) is standardized relative to its lowest value.

A few species have been critically impacted by fishery in the ecoregion. One of these species is Atlantic halibut *Hippoglossus hippoglossus*. The biomass survey index for Atlantic halibut decreased between 1985 and 1995 and has since then remained at a low levels, with a small increase observed in 2015 and 2016. Additional management measures, a mandatory release of viable halibut and a landings ban, were introduced in 2012.

Impact on threatened and declining fish species

Several of the species listed on the OSPAR list of threatened and declining species are known bycatch species in the Icelandic fishery. However, landings are in general small or incidental and little is known about the impact of fishery on these species.

Impact on seabirds and marine mammals

Bycatch of seabirds, small cetaceans, and seals is known to occur in bottom setnets, particularly in Breidafjordur (western Iceland) and in the north. Harbour porpoise *Phocoena phocoena* is the most commonly bycaught marine mammal, but seals are also caught, especially in the lumpsucker *Cyclopterus lumpus* fishery. The main bycaught seabird species are northern fulmar *Fulmarus glacialis*, common murre *Uria aalge*, northern gannet *Sula bassana*, black guillemot *Cepphus grille*, and common eider *Somateria mollissima*, all caught in bottom setnets. Bycatches in gillnets targeting cod have decreased, associated with a large decrease in effort. The annual estimate of bycatch of harbour porpoise has also decreased, from 7300 animals in 2003 to 900 in 2015. Data from the most recent (2007) aerial survey of Icelandic coastal waters show that the estimated incidental captures of harbour porpoise in 2015 comprise 0.53% of the estimated abundance.

Abrasion

The main abrasive pressure in the Icelandic Waters ecoregion is caused by mobile bottom-fishing gears (targeting fish, shrimp, and Norway lobster *Nephrops norvegicus*). Other occasional abrasion pressures (surface and subsurface) that exert localized impacts include telecommunication and power cable laying on the ocean floor, anchoring, and static gears.

Based on analysis of electronic logbook data an area of about 79 000 km^2 in total was fished with towed bottom-fishing gears in 2013, composing 10% of the ecoregion. The total fishing effort by bottom trawls targeting fish and shrimp has decreased by around 40% in 2000–2014; in the same period the *Nephrops* trawling effort remained at the same level. The decrease in fishing effort varied locally, with decreases mainly being noted on the southern shelf (Subarea 1) and at typical shrimp trawling grounds on the northern shelf (Figures 7 and 8).

Within the ecoregion, abrasion caused by bottom trawls has been shown to impact fragile three-dimensional biogenic habitats in particular (e.g. sponge aggregations, coral gardens, and coral reefs), with impacts happening mainly in deeper waters (> 200 m). Effects of bottom trawling on soft substrates in shallow waters have been shown to be minor. Other impacts involve overturning boulders, scouring the seabed, and direct removal of and/or damage to epifaunal organisms.

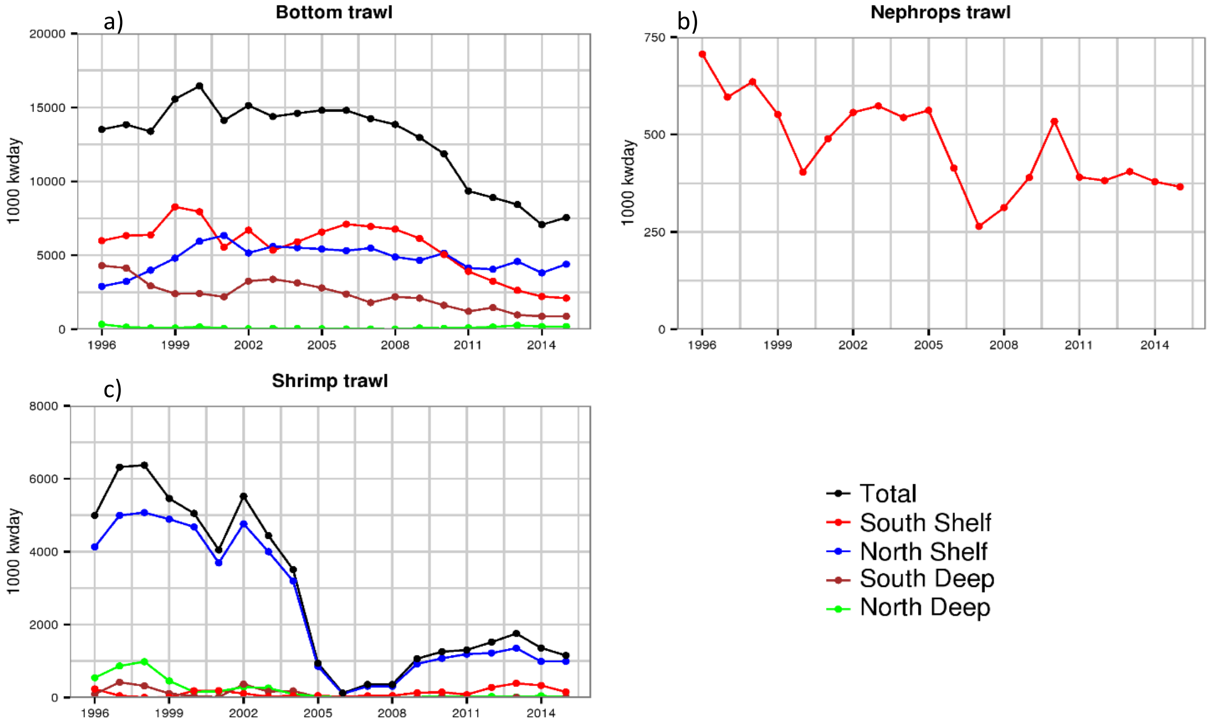

Figure 7 Annual total bottom-trawl fishing effort (1000 kW day) based on logbooks from trawl fishery targeting (a) fish, (b) Norway lobster, and (c) shrimp in the whole Icelandic Waters ecoregion between 1994 and 2014.

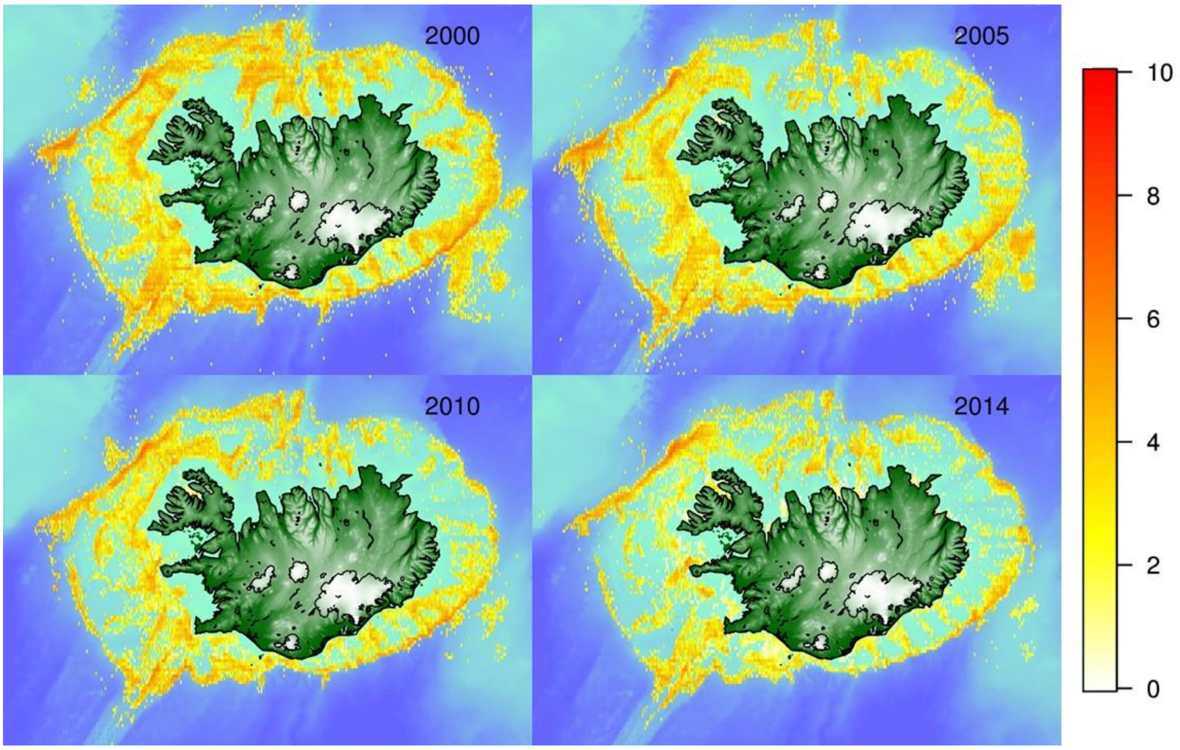

Figure 8 Spatial distribution of bottom-trawl effort (1000 kW hr) based on logbooks from trawl fishery targeting demersal fish, shrimp, and Norway lobster in 2000, 2005, 2010, and 2014.

Sediment smothering

The most widespread human activity contributing to smothering in the Icelandic Waters ecoregion is commercial bottom fishing. In local inshore areas harbour dredging, aggregate extraction of non-living (e.g. sediments) and maerl resources, sediment dumping, cable and pipe laying, and various coastal developments like aquaculture and land reclamation have also caused smothering. In total, 230 046 tonnes of dredged material and 40 138 tonnes of inert material were reported to have been dumped or placed at sea in this ecoregion in 2013.

It is difficult, from lack of data, to evaluate the magnitude of the impact of trawl-induced smothering, but it is likely to have decreased over the last two decades, concomitant with reduced trawl fishing activity.

Coastal habitat loss

Coastal habitat loss in the Icelandic Waters ecoregion is caused by various coastal developments, including land reclamation for coastal defences, road building, harbour construction, aggregate extraction, and the construction of bridges across fjords. The level of human activity in coastal areas within the ecoregion is limited and the main coastal developments are related to fisheries. However, there is increased pressure from various activities carried out within coastal areas, particularly to the west of Iceland. On their own, each of these activities may not cause substantial pressure on coastal environments, but when combined they may have localized impacts.

Considering the patchy distribution of settlements in a nation of 330 000 people, these effects are small and localized. Marine aquaculture is a small industry with an annual production of less than 20 000 tonnes, mostly salmon. However, there is a growing interest in aquaculture and a considerable expansion of the activity is planned in fjords along the western and eastern coastlines. The increased traffic of tourists in coastal areas, from sightseeing, whale watching, and sport angling may cause increased localized pressure.

Other pressures

"Other pressures" represents a suite of pressures that are known, or suspected, to affect the Icelandic marine ecosystem.

The carbonate system parameters have been monitored since 1983 at two time-series stations in the Icelandic Waters ecoregion. Data show that the rate of ocean acidification north of Iceland is rapid and surface pH in winter decreases at a rate of 0.0024 yr^{-1}, which is 50% faster than average yearly rates reported from the subtropical Atlantic. In the deep-water regime (> 1500 m), the rate of pH decline is a quarter of that observed in surface waters. Experimental research confirms that survival, calcification, growth, development and abundance can all be negatively affected by ocean acidification, but the scale of response can vary greatly for different life stages, between taxonomic groups, and according to other environmental conditions, including food availability.

The input of nutrients into Icelandic waters is not considered an important pressure because of the limited agriculture and small human population. Measurements show low concentration levels of heavy metals and persistent organic pollutants, and the concentration of most contaminants are declining. The OSPAR area I (Arctic waters, which includes the Icelandic Waters ecoregion) has no current eutrophication issues.

The monitoring of plastic pollution has started recently, and compared to other ecoregions it is not considered a significant pressure in the Icelandic Waters ecoregion. The main source of plastic recorded in monitoring programmes originates from fishing (synthetic nets, lines, etc.).

Maritime transport is small within the Icelandic Waters ecoregion compared to many other ecoregions, mainly cargo (in the southwest) and fishing vessels, and in later years cruise ships. In order to reduce the risk to ecologically fragile areas from maritime traffic (sinking, stranding, oil spillage, ballast water), ship lanes have been moved further out from the coast.

State of the ecosystem components

Habitat (substratum)

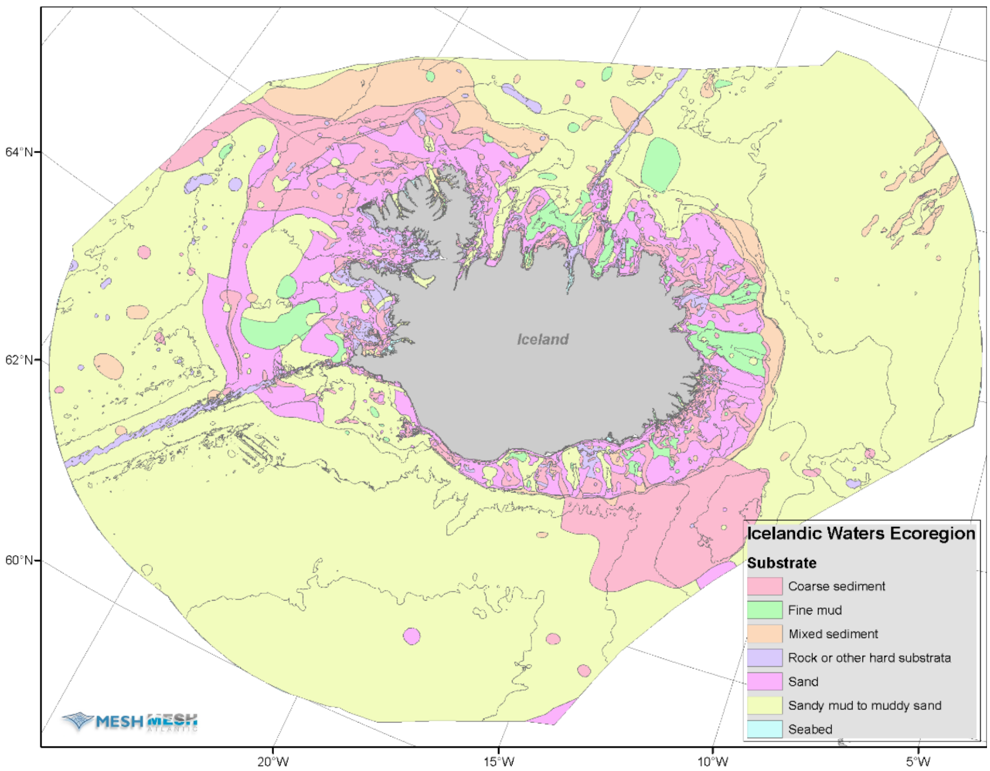

Figure 9 Major substrates in the Icelandic Waters ecoregion (compiled by EMODNET substrate habitats; www.emodnet-seabedhabitats.eu).

The various geomorphological and substrate features of the seafloor provide a broad range of habitat types. Differences in the oceanographic settings off northern and southern Iceland have a large influence on the spatial distribution patterns of benthic habitats, and the Greenland–Iceland–Faroes Ridge acts as a distribution barrier for many species. The fauna is influenced by the warm Atlantic water in the south and the cold Arctic water in the north. The main substrate types around Iceland are mud, gravel, and lava (rock and other hard substrates).

Productivity (phytoplankton)

The variability in dynamics and magnitude of phytoplankton growth seems to depend on local environmental conditions in the ecoregion rather than large-scale events such as the North Atlantic Oscillation (NAO). These changes affect zooplankton grazing pressure and the carbon flux through the food chain. Primary production on the Iceland shelf is high (150–300 g C m^{-2} $year^{-1}$) and the productivity is highest in the southwest. The onset of phytoplankton spring bloom varies between mid-April and mid-May. A trend of later onset of blooms south of Iceland has been observed since 2006. High inflow of Atlantic water to the northern shelf area of Iceland leads to increased primary production. Diatoms dominate the phytoplankton spring bloom over the Icelandic shelf. Dinoflagellates increase in abundance after the spring bloom, while diatoms continue to be relatively abundant. In the autumn there is usually a second bloom of diatoms and dinoflagellates. In some springs the prymnesiophyte *Phaeocystis pouchetti* becomes predominant in the waters to the north of Iceland.

Zooplankton

Mesozooplankton abundance and biomass is generally dominated by *Calanus finmarchicus*. Mesozooplankton community structure differs south and north of Iceland, being mainly dictated by temperature and salinity differences. Macroplankton is dominated by euphausiids over the shelf edges in the south and west, and in the oceanic areas all around the island. In the oceanic areas north of Iceland, amphipods are also abundant.

The spring mesozooplankton biomass in the upper layers (0–50 m) generally ranges from ca. 1 to 10 g dry weight m^{-2}, with an average of 2–4 g dry weight m^{-2}. Relatively high biomass is usually observed in shelf waters off the southern and western coasts, in the oceanic waters to the north and northeast of Iceland where the Arctic influence is the greatest and large Arctic species dominate, and in offshore waters of the Irminger and Norwegian seas.

Fish

The Icelandic Waters ecoregion contains over 25 commercially exploited stocks of fish and marine invertebrates. The main demersal species include cod, haddock, saithe, redfish, Greenland halibut and various other flatfish, wolffish, tusk, and ling. The main pelagic species are capelin, summer-spawning herring, Norwegian spring-spawning herring, and mackerel. Most fish species spawn in the warm Atlantic water off the southern and southwestern coasts. Fish larvae and 0-groups drift west and then north from the spawning grounds to nursery areas on the northwestern, northern, and eastern Iceland shelf, where they grow in a mixture of Atlantic and Arctic water.

Several major changes in the abundance, distribution, and migration patterns of the pelagic fish stocks around Iceland have taken place in recent decades, resulting from fishery, oceanographic conditions, prey availability and/or stock density. In the late 1960s, the three herring stocks found in the Icelandic Waters ecoregion collapsed. While the Icelandic summer-spawning herring recovered within several years, the Icelandic spring-spawning stock has not recovered yet. The Norwegian spring-spawning herring disappeared from the whole Icelandic Waters ecoregion simultaneously, but after recovery it has since the early 2000s progressively reoccurred on its traditional feeding grounds east and north of Iceland. From the mid-2000s, Atlantic mackerel extended its feeding grounds, moving from the Norwegian Sea to Icelandic waters in large quantities. At the same time the summer feeding grounds of capelin moved westward, from the Icelandic Waters ecoregion to Greenlandic waters, while the main spawning grounds remained southwest of Iceland.

For the stocks with analytical assessments, reference points have been defined and the spawning-stock biomass is in all cases above $B_{trigger}$ (Figure 10). The trends in survey biomass for gadoids and other species (redfish, tusk, ling, and wolffish) show biomass indices that are two to three times higher than their lowest observed value (Figure 11). The average survey biomass for the flatfish species is currently around two times the lowest observed value.

The pelagic fish stocks are also assessed with analytical methods. The SSB of Icelandic summer-spawning herring was at its historical maximum around 2008, but has since decreased caused by mortality as a result of *Ichthyophonus* sp. infection and poor recruitment (Figure 10). The abundance trends for the highly migratory stocks, mackerel, blue whiting, and Norwegian spring-spawning herring, are presented in the Norwegian Sea ecosystem overview.

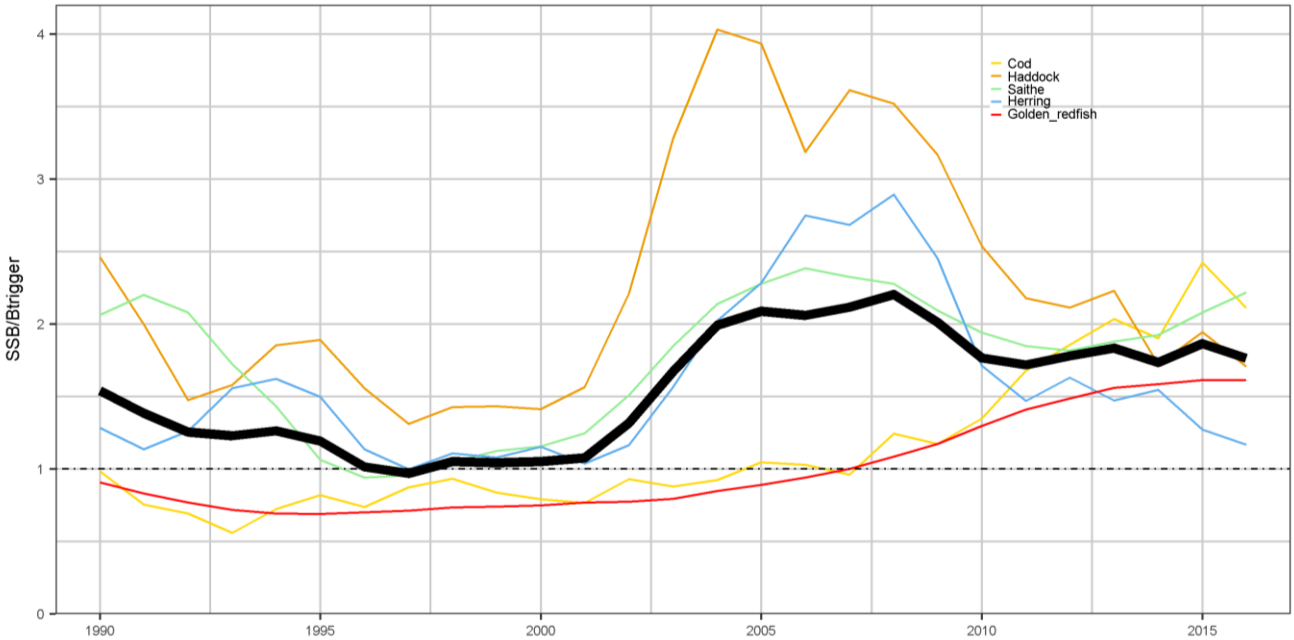

Figure 10 Relative spawning-stock biomass (SSB to $B_{trigger}$ ratios) for cod, haddock, saithe, golden redfish, and herring. The dotted line denotes $B_{trigger}$.

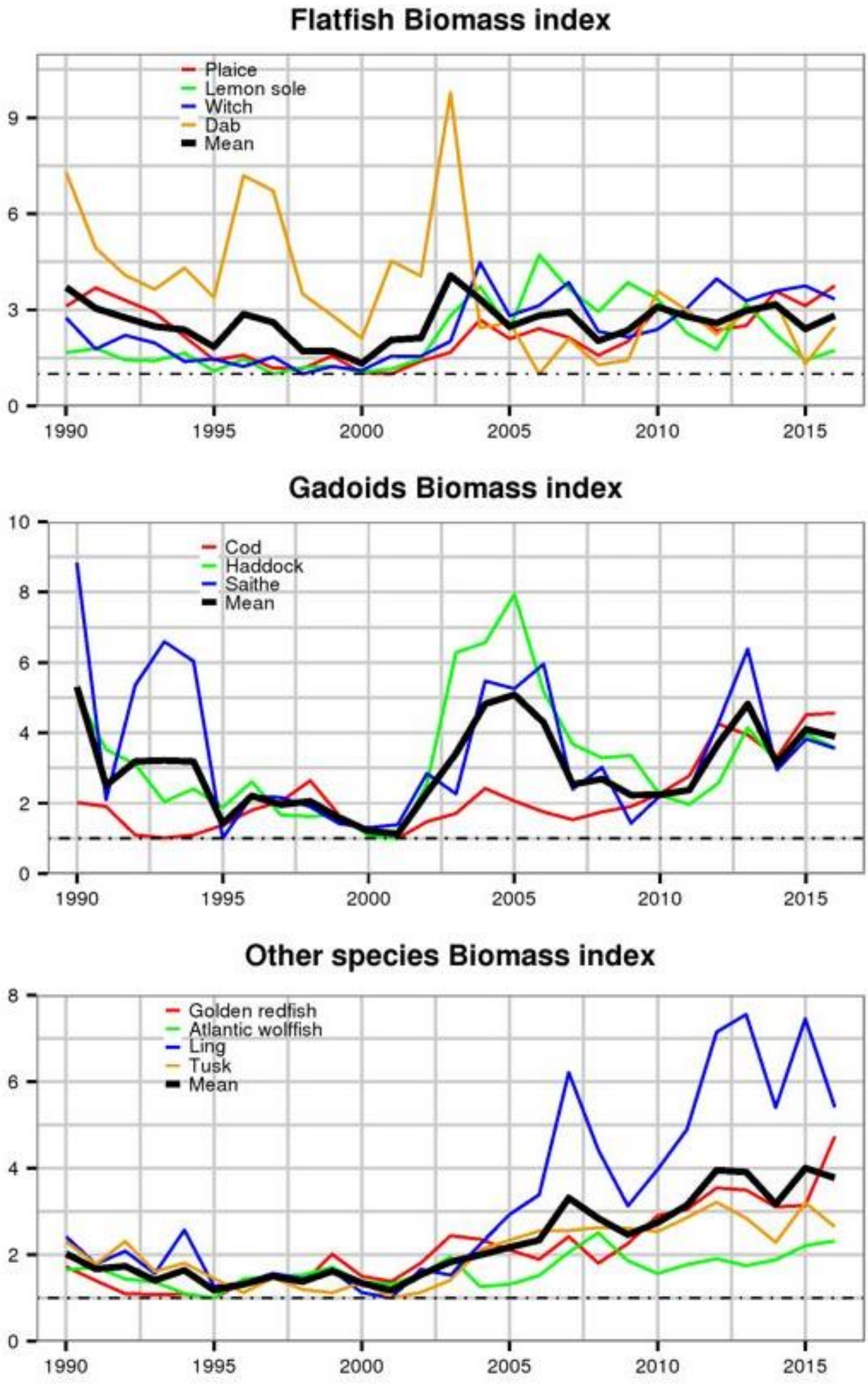

Figure 11 Trends in survey biomass, relative to its lowest value observed for plaice, lemon sole, witch, dab, cod, haddock, saithe, golden redfish, Atlantic wolffish, ling, and tusk. Note that the average (dashed line) is also standardized relative to its lowest value.

Foodweb structure

The Icelandic Waters ecoregion foodweb is characterized by high primary production. Capelin is a key species in the ecoregion and its lifecycle and migration pattern is an important energy transfer in the ecosystem. Capelin feeds mainly on copepods and euphausiids in waters north of Iceland and then moves to Icelandic waters where it is one of the most important prey for many species, e.g. cod, haddock, saithe, Greenland halibut, seabirds, and marine mammals. Other prey species of lesser importance are shrimp and sandeel. The annual consumption of fish, cephalopods, and crustaceans by cetaceans within the Icelandic Waters ecoregion has been estimated at 6.3 million tonnes. The foodweb has been affected by changes in hydrography, the capelin fishery, increased immigration of mackerel, and the increasing abundance of large baleen whales. Unlike capelin, mackerel feeds in the ecoregion and are a minor prey item, thereby exporting energy from the system.

Seabirds

Around 30–50 million seabirds, consisting of 22 species, are found within the ecoregion. Substantial proportions of the total North Atlantic populations of some species are found there. Annual food consumption of six common seabird species has been estimated at 171 000 tonnes of capelin, 184 000 tonnes of sandeel and 34 000 tonnes of euphausiids. The abundance of breeding Brünnich's guillemot *Uria lomvia*, common guillemot (murre) *Uria aalge*, razorbill *Alca torda*, Northern fulmar, and kittiwake *Rissa* spp. have declined between 1985 and 2008 by 43%, 30%, 18%, 35%, and 12%, respectively. The number of kittiwakes and European shags *Phalacrocorax aristotelis* breeding in western Iceland declined by 44% and 31%, respectively between 1993 and 2007, representing an annual rate of decline of 5.7% for kittiwakes. Reduced prey availability has been suggested as the main cause for their decline. Four other species have either shown recent decline or no change. Data on the remaining eleven species is limited. Amongst those, puffin *Fratercula artica* populations have decreased south and west of Iceland over the last decade, presumably also because of reduced availability of prey, especially sandeel.

Mammals

Six pinniped species occur in the Icelandic Waters ecoregion but only two of these breed locally (grey seals and harbour seals). Both species are currently in decline. The harbour seal population has decreased from 33 000 animals in 1980 to 7700 animals in 2016, the lowest in the time-series. The largest decline occurred between 1980 and 1989 when a bounty system was in effect (Figure 12). The Icelandic grey seal population has decreased from an estimated 9000 animals in 1982 to 4200 animals in 2012. A new grey seal census is planned in 2017.

23 species of cetaceans have been observed in Icelandic waters, twelve of which are seen on a regular basis. Cetacean surveys have been conducted at regular intervals between 1987 and 2016 and reveal varying trends in abundance. Humpback whales have shown high rates of increase and fin whales also increased during 1987–2001 in the central North Atlantic, and particularly in the Irminger Sea between Iceland and Greenland in 1987–2015. The abundance of minke whales has decreased substantially in Icelandic coastal waters since 2001, most likely owing to decreased availability of important prey species such as sandeel and capelin.

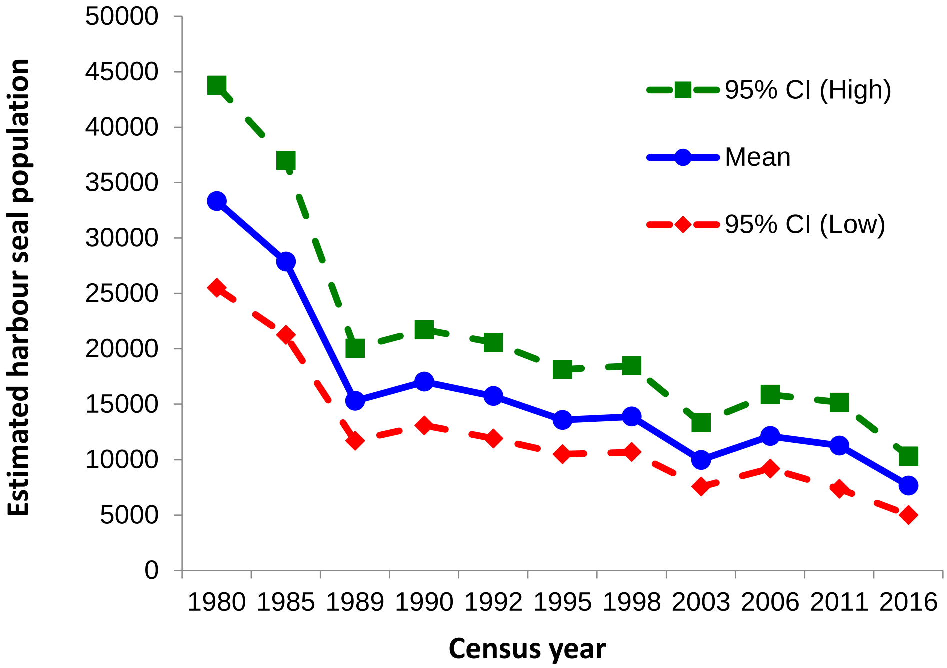

Figure 12 Trends in the Icelandic harbour seal population from 1980 to 2016. The mean values (blue) and 95% confidence intervals are shown.

Invasive species

The Icelandic Waters ecoregion has 22 non-indigenous and cryptogenic (obscure or of unknown origin) species. This is a diverse group of species belonging to phytoplankton, macroalgae, crustaceans, bivalves, tunicates, and fish. Four of those species (the brown seaweed Phaeophyceae, Atlantic rock crab *Cancer irroratus*, brown shrimp *Crangon crangon*, and flounder *Platichthys flesus*) are invasive in Icelandic waters but are native to other ICES ecoregions. The majority (twelve) of the non-indigenous species arrived between 1950 and 1999, with six species arriving since the beginning of the 21st century. Consequently, the annual rate of discovery increased from 0.2 per year during 1950–1999 to 0.4 per year during 2000–2016. At least one of the recently arrived non-indigenous species, the Chilean crab *Cancer plebejus*, is not yet registered in the neighboring areas (Faroe Plateau, Barents Sea, Greater North Sea, and Norwegian Sea).

The main pathway for introductions is vessels, either through ballast water or ship hull fouling. Secondary spread from neighbouring areas may account for the arrival of a few non-indigenous species. Ecological impacts caused by the non-indigenous species in this region is very poorly known.

Threatened and declining species and habitats

Table 1 Threatened and declining species in the Icelandic Waters ecoregion, according to OSPAR.

SCIENTIFIC NAME	COMMON NAME
SEABIRDS	
Rissa tridactyla	Black-legged kittiwake
Uria lomvia	Thick-billed murre (or Brünnich's guillemot)
FISH	
Anguilla anguilla	European eel
Centrophorus squamosus	Leafscale gulper shark
Cetorhinus maximus	Basking shark
Dipturus batis	Common skate
Hoplosthethus atlanticus	Orange roughy
Lamna nasus	Porbeagle
Petromyzon marinus	Sea lamprey
Salmo salar	Salmon
Squalus acanthias	[Northeast Atlantic] spurdog
MARINE MAMMALS	
Balaenoptera musculus	Blue whale
Eubalaena glacialis	Northern right whale

Table 2 Threatened and declining habitats in the Icelandic Waters ecoregion, according to OSPAR.

HABITATS
Coral gardens
Deep-sea sponge aggregations
Intertidal mudflats
Lophelia pertusa reefs
Modiolus modiolus beds
Seamounts
Zostera beds

Sources and acknowledgments

The content for the ICES regional ecosystem overviews is based on information and knowledge generated by the following ICES processes: Workshop on Benchmarking Integrated Ecosystem Assessment (WKBEMIA) 2012, ACOM/SCICOM Workshop on Ecosystem Overviews (WKECOVER) 2013, Workshop to draft advice on Ecosystem Overviews (WKDECOVER) 2013, and Advice drafting group to finalize draft Ecosystem Overviews (ADGECO) 2017, which provided the theoretical framework and final layout of the documents. The Marine and Freshwater Research Institute in Iceland (MFRI) contributed to the main sections of this overview. The following working groups contributed to draft the subsections on the state of the ecosystem components: Working Group on Zooplankton Ecology (WGZE), Working Group on Marine Mammal Ecology (WGMME), Working Group on Introductions and Transfers of Marine Organisms (WGITMO), and the Joint Working Group on Seabirds (JWGBIRD). References have been removed from the text for clarity and can be found below.

Those maps and GIS products produced by the ICES Secretariat used data from:

1. Exclusive Economic Zones. *Marineregions.org (VLIZ).*
2. Depth contours. *General Bathymetric Chart of the Oceans (GEBCO).*
3. Ecoregions. *International Council for the Exploration of the Sea (ICES).*
4. Ports (MFRI).
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