ACCESS
Arctic Climate Change
Economy and Society

Project no. 265863

ACCESS

Arctic Climate Change, Economy and Society

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D5.12 – NEAFC enlargement project review

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CO	Confidential, only for members of the consortium (including the Commission Services)	X

LCP delivered the D5.12 to the WP5 leaders and the Project Management Board on January 2015. The report was assessed and was considered as a preliminary version of what was expected. The NERC partner, assisted by UPMC revised and standardised the deliverable making a number of substantial changes to the original report from LCP. The contribution of NERC to the original report leads to appoint this partner as joint author of the report.

Executive Summary

While it is certain that climate change in Arctic Ocean will have an impact on fisheries it is not possible to predict accurately what all these changes will be. An example of one such change is the shift in distribution of some stocks. This raises the question of how to manage such stocks.

This report gives an overview of the context in which fisheries currently take place in the Arctic. It identifies fishing areas and existing Regional Fisheries Management Organisations (RFMOs) of relevance to Arctic fisheries as well as fish stocks and fishery statistics. The impacts of climate change on Arctic marine ecosystems, fish stocks and fisheries are also discussed. The role of the EU in relation to fisheries in the Arctic is described. Similarly, the role of RFMOs is described, in particular, the structure and objectives of the North East Atlantic Fisheries Commission (NEAFC). The final section explores the potential positive and negative aspects for expanding the spatial scope of the NEAFC convention area, the development of a new Implementing Agreement under UNCLOS and the establishment of an Arctic RFMO. The report concludes that in the rapidly changing economic and environmental conditions in the Arctic expansion of the spatial scope of the existing convention, the NEAFC seems to be the most appropriate way forward.

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Introduction

In WP5, we deal either with existing governance tools or with "gaps". As we will see later on, "D5.12" certainly deals with an existing governance tool, namely the "North-East Atlantic Fisheries Commission", but the purpose of the present study also consists in examining whether the "NEAFC enlargement project" would be a better option than the establishment of a new Regional Fisheries Management Organization (RFMO). In saying so, we realize that the two nevertheless useful WP5 categories, "existing tools" and "gaps", are not to be considered as mutually exclusive.

Assessing Arctic fisheries governance and the EU, we will keep in mind two particular statements extracted from the 2008 Commission's Communication[i] :

- "The main problems relating to Arctic governance include the fragmentation of the legal framework, the lack of effective instruments, the absence of an overall policy-setting process and gaps in participation, implementation and geographic scope."

- "In principle, extending the mandate of existing management organizations such as NEAFC is preferable to creating new ones".

I. Definition of Arctic marine areas

Always bearing in mind that ACCESS project is aimed at studying economical, environmental and social impact of the Arctic climate change, we see the "NEAFC enlargement project" as a direct consequence of Arctic climate change on fishing activities in the arctic seas and sub-arctic marines areas.

Arctic marine ecosystems including fisheries are highly vulnerable to the general impacts of climate change. A major reason is the change in ice coverage, which is a unique characteristic of this region.

The impacts of climate change have been demonstrated to influence fisheries resources. One way to estimate how climate change has affected fish stocks is via persistent shifts in spatio-temporal distribution. Although examples of climate-forced distribution shifts abound, it is unclear how these shifts are practically accounted for in the management of fish stocks. In particular, how can we take into account shifting stock distribution in the context of stock assessments and their management outputs?[1]

I.1 Biological definition

As the sea ice act as a limiting factor for most of the marine Arctic biodiversity, being of critical importance for most of their biological functions to be adequally accomplished, sea ice presence and seasonal variations must be taken in account to build an accurate Arctic Seas biological definition. In this Deliverable, we will define the Arctic Seas to all Arctic and Subarctic waters where sea ice is present during at least the spring months, from February to May-June.

According to this biological definition, the Arctic Seas as we will refer in this document correspond to the FAO Area 18 (Arctic Sea) plus the northern part of Areas 21 (North-West Atlantic except subareas 3 to 6), 27 (North-East Atlantic except South Barents and Norwegian Seas), 61 (North-West Pacific) for the Western Bering and Okhotsk Seas, and 67 (North-East Pacific) for the Eastern Bering Sea (FAO Areas maps available on FAO website: http://www.fao.org/fishery/area/search/en).

Table 1: Arctic Seas definition

Atlantic Arctic Basin	Pacific Arctic Basin	Central Arctic Ocean
Hudson Bay, Foxe Basin, Ungava Bay (FAO Area 18)	Laptev Sea, East Siberian Sea (FAO Area 18)	(FAO Area 18), Northern Barents Sea (FAO Area 27)
Davis Strait (FAO Area 21)	Chukchi Sea (FAO Area 18)	
Baffin Bay (FAO Area 21)	Bering Sea (FAO Area 61 + 67)	
Greenland and southern Barents Seas (FAO Area 27)	Okhotsk Sea (FAO Area 61)	
White Sea (FAO Area 27)	Beaufort Sea (FAO Area 18)	
Kara Sea (FAO Area 18)	Bays and straits of western Canadian Arctic Archipelago (FAO Area 18)	

[1] Link, J. S., Nye, J. A. and Hare, J. A. (2011), Guidelines for incorporating fish distribution shifts into a fisheries management context. Fish and Fisheries, 12: 461–469. doi: 10.1111/j.1467-2979.2010.00398.x http://onlinelibrary.wiley.com/doi/10.1111/j.1467-2979.2010.00398.x/abstract

This biological definition of Arctic Seas is concordant with the subdisions of Arctic Ocean and Adjacent Seas (AOAS) used by the Conservation of Arctic Flora and Fauna (CAFF) to enumerate Arctic marine mammal species in the Arctic Biodiversity Assessment presented to the Arctic Council in 2013.

Considering marine living resources managment, the ecosystem-based management approach, initiated by the World Summit on Sustainable Development in Johannesburg in 2002, conducted in 2009 to a first subdivision of World Seas in Large Marine Ecosystems (LMEs), coordinated by UNEP Regional Seas Programme[ii]. These LMEs physical limits are defined on ecological criteria: 1 bathymetry, 2 hydrography, 3 productivity, and 4 trophic relationships.

Arctic Ocean and Adjascent Seas were initially subdivided in 17 LMEs, in 2006, a subvision endorsed by the Arctic Council Ministers in October 2006. The boundaries of these Arctic LMEs have been revised on new ecological data and provided in 2013 a more accurate Map[iii], which will be used in the following Arctic fisheries evaluation.

Detailed bounderies and statistics of the 18 Arctic and subarctic LMEs can be found on the Sea Around Us Project website (http://www.seaaroundus.org/lme/).

Figure 1. Arctic LMEs

Considering the specific oceanographic caracteristics of the AOAS, Norwegian and Barents Seas constitute the main warm Atlantic waters gateway into the AOAS, and Bering and Chukchi Seas the warm Pacific waters gateway. These oceanologic gateways (dashed areas, Figure 1) are also the main boreal marine fauna entrance in the AOAS waters.

On an oceanographicview (temperature and salinity, ice cover…), Iceland Shelf, Feroe Plateau and Okhostk Sea, which share many caracteristics with Labrador and Nefoundland Seas, have to be considered as cold temperate ecosystems, and we will not include them in the Arctic fishery analyse. In the present deliverable, Arctic LMEs will be reduce to the Arctic Ocean, the 9 Arctic Basin Seas and the Atlantic and Pacific gateways LMEs (15 LMEs).

I.2 Arctic Seas FAO Areas and existing RFMOs

Arctic Seas are covered by 5 FAO fishing areas[iv]: area 18, Arctic Sea, covering most of tohe geographical Arctic Ocean and Canadian Arctic Archipelago waters, including Hudson Bay; area 21, Northwest Atlantic, covering cold temperate waters outside the Arctic Seas; area 27, Northeast

Atlantic, covering cold temperate waters outside the Arctic Seas; area 61, Northwest Pacific, covering cold temperate waters outside the Arctic Seas; area 67, covering cold temperate waters outside the Arctic Seas.

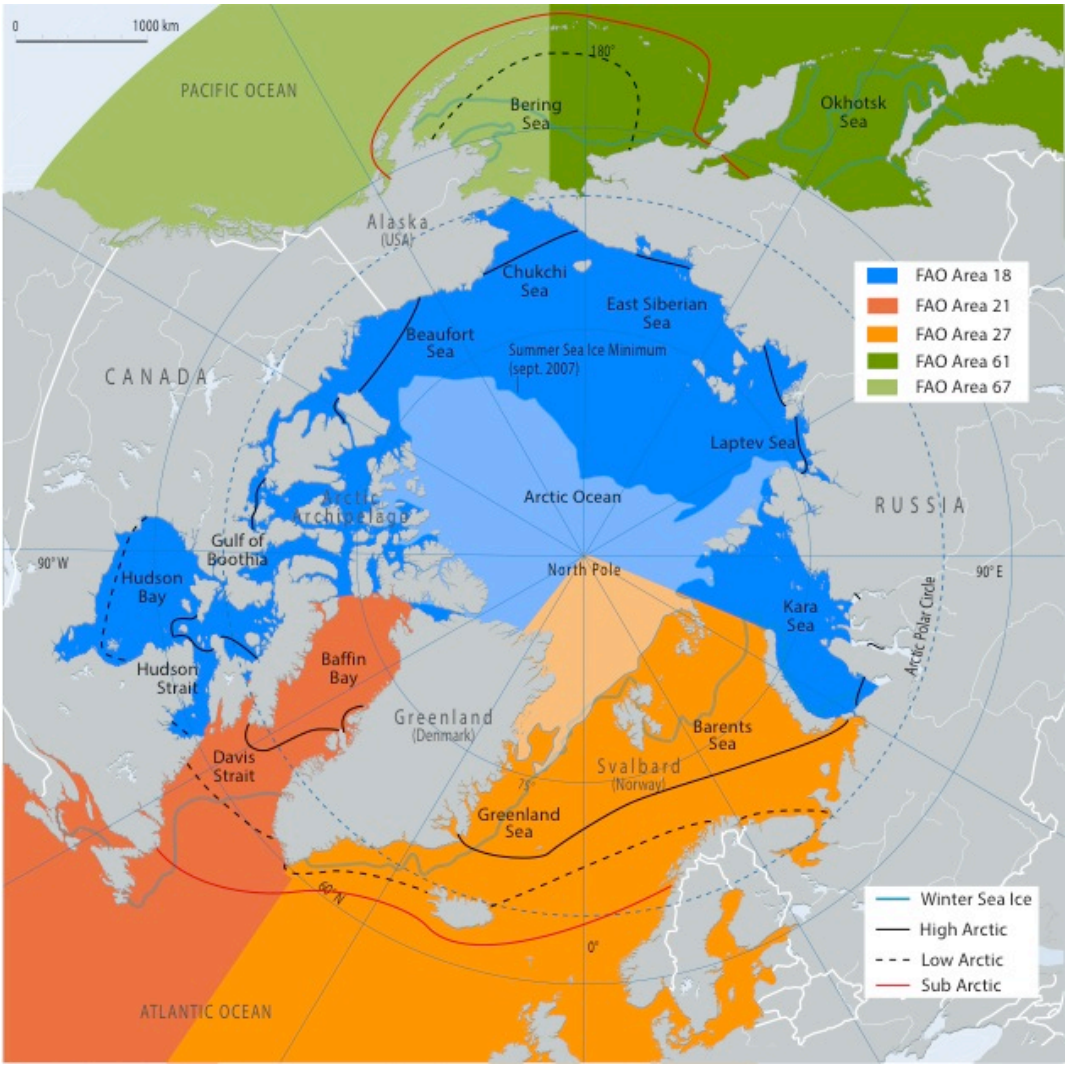


Figure 2. FAO northern fishing areas

The most part of central Arctic Ocean, corresponding to the complete FAO area 18, is free of any RFMO.

The north Atlantic Ocean is completly covered by two RFMOs, the North Atlantic Fisheries Organization (NAFO) for the northwest, covering the whole FAO area 21, and NEAFC, corrsponding to the FAO area 27 except for the eastern most part of Barents Sea, from a line joining the North Pole to the northern tip of Nova Zemlaya to the eastern most NEAFC limit (50° E). Three more international commissions also cover it, the NAMMCO (North Atlantic Marine Mammal Commission) corresponding to the complete FAO area 27, and the scientific advisement body ICES (International Council for the Exploration of the Sea) covering the same area, and the NASCO (North Atlantic Salmon Conservation Organization) covering the entire area 27 plus the area 21.

The North Pacific region is covered by three limited RFMOs, the CCBSP (Convention on the Conservation and Management of Pollock Resoureces in Central Bering Sea) restricted to the central Bering Sea used by Pollock for reproduction, the IPHC (International Pacific Halibut Commission (IPHC) covering the entire FAO area 67, and the more generalized NPAFC (North Pacific Anadromous Fish Commission) covering the international waters (outside the EEZs) of North Pacific FAO areas 61 and 67. An additional scientific organisation, the PICES (North Pacific Marine Sciences Organization) cover the entire FAO areas 61 and 67, having the same advise function than the ICES in North Atlantic region.

For more details on RFMOs and other resource management international coorperation bodies juridictions and States members, read section "IV.2 Regional Fisheries Managment Organizations".

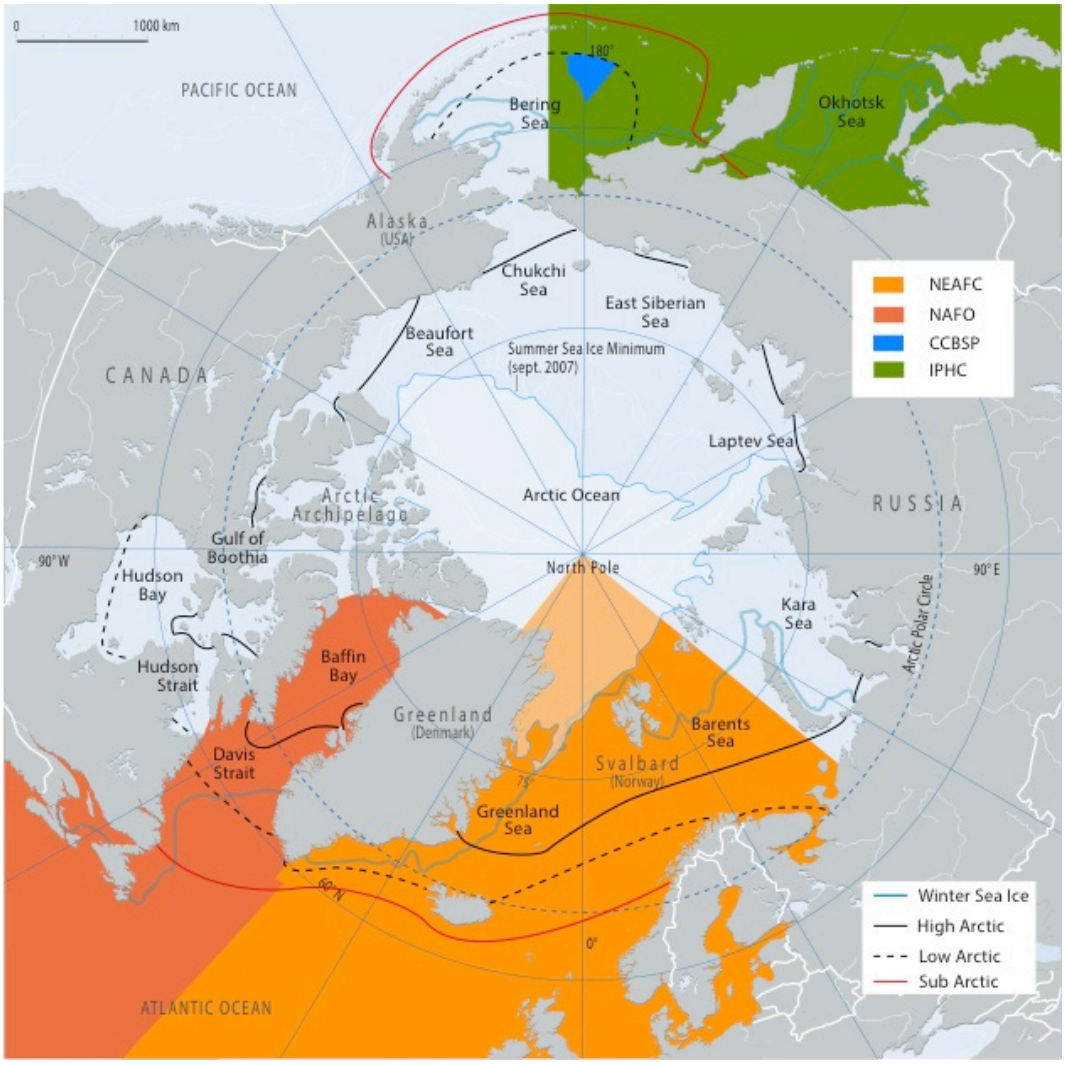


Figure 3. Arctic Seas RFMOs juridictions

II. The context of Arctic climate change

II.1 Arctic Marine fish diversity

Despite most Arctic Basin ice-covered Seas are nearly unexplored and marine fauna unknown, 815 species of fishes have been already observed in the 15 Arctic LMEs. On their oceanographic (temperature, salinity, sea ice affinity…) and geographic distribution, they can be classified in four categories: Arctic, Arctico-boreal, Boreal and Worldwide, the latest including widely or both hemispheric distributed species (See Annex 1 "Arctic Fish Listing" for complete listing).

As expected, boreal species, which spawn solely at positive temperatures but may enter subzero waters for feeding excursions, dominates the known Arctic Seas fish community with 552 species (67 %). These species occupy the Arctic Gateways LMEs (Barents and Bering Seas), but are absent of the most remoted and the ice covered seas of the Arctic Basin (Arctic Ocean, Arctic Archipelago, Kara Sea, Laptev Sea and East Siberian Seas) and being restricted to the southern most part of Baffin Bay/Davis Strait, West Greenland Shelf and East Greenland Sea LMEs.

Worldwide species represent 159 species (19.5 %) and are restricted to the sousthern most part of Arctic Gateways Seas. As Arctic Seas are located to the northern limit of their geographical range, their Arctic populations are poorly represented, being for most of them only known by few individuals. Many deep-sea and highly migratory species belong to this group.

Arctic-boreal species are distributed in Arctic and sub-Arctic/boreal seas, and they may spawn either at subzero or positive temperatures. Represented by only 38 species (capelin, Greenland halibut, pink salmon, Greenland shark…), these fishes are found in most of the 15 Arctic LMEs except the southern most parts of Pacific and Atlantic Gateways and the northern most part of Arctic Basin (summer ice-covered regions).

The 67 Arctic species are confined to ice-laden seas and spawn solely at subzero temperatures. They are only infrequently found in sub-Arctic seas. Arctic cod, polar cod and navaga are sea ice dependant, living in close contact with it as far to be freezed in it during winter (anti-freeze proteins replacing hemoglobin to protect them).[2]

Given these zoogeographic categories, targeted fishes in the AOAS include fifty boreal (~85%), six Arctic-boreal (~10%), and only three Arctic (~5%) species. Arctic specie are harvested to a limited extent by Russia in the Barents, White and Kara Seas – i.e. the gadoids polar cod (*Boreogadus saida*) and navaga (*Eleginus nawaga*) and the Arctic flounder (*Liopsetta glacialis*)[v].

II.2 Marine fishery in the Arctic Seas

Arctic fisheries broadly comprise the coastal and estuarine subsistence fishing (mainly aboriginal) and recreational catches of local importance and the high-tech commercial fishing fleet that support fishing industries worldwide. Catch statistics are largely biased due to large amount of unreported catches, most of aboriginal take in coastal waters of Arctic Seas as well as bycatches of untargeted species by commercial fleets in subarctic waters (ie. Barents and Norwegian Seas or Bering Sea, the main regions operated by commercial fleets).

[2]http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4255237/
http://onlinelibrary.wiley.com/doi/10.1111/gcb.12395/pdf

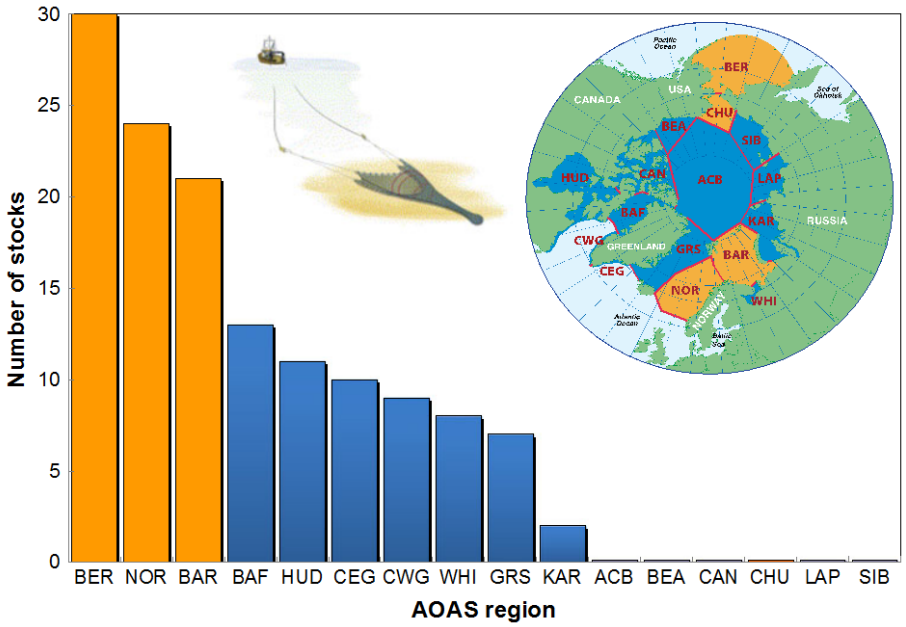


Figure 4.

Number of marine fish species ('stocks') currently harvested by industrial fisheries in the Arctic Ocean and adjacent seas (AOAS). *The examined AOAS regions are shown in the inserted map. Geographic delineation follows the International Hydrographic Organization (http://www.iho.int). The Arctic gateways are shown in orange and the Arctic seas in deep blue. Regional codes are ACB, Arctic Central Basin; BAF, Baffin Bay; BAR, Barents Sea; BEA, Beaufort Sea; BER, Bering Sea; CAN, Canadian Arctic Archipelago; CEG, Coastal East Greenland; CWG, Coastal West Greenland; CHU, Chukchi Sea; GRS, Greenland Sea; HUD, Hudson Bay Complex; KAR, Kara Sea; LAP, Laptev Sea; NOR, Norwegian Sea; SIB, East Siberian Sea; WHI, White Sea. Note that the same species may be harvested in more than one region.* [vi]

Currently, 59 marine fish species ('stocks') in toto are targeted by industrial fisheries in the AOAS[vii]*. These are all bony fishes (Actinopterygii) although sharks and allies (Chondrichthyes) constitute a worrying but largely unreported bycatch. The largest fisheries, by far, are confined to sub-Arctic/boreal waters, i.e. the Bering Sea (n = 30 stocks) and the Atlantic Arctic gateway (n = 21–24 stocks). Significant fisheries also take place in Baffin Bay, along the west coast of Greenland and in the Greenland Sea (n = 9–13 stocks).*

The freezing Arctic seas, on the other hand, are characterized by small-scale subsistence fisheries among indigenous peoples. During the period 1950–2006, subsistence catches for a range of species, mostly freshwater and diadromous fishes, accumulated to about 950 000 tonnes[viii]*. This is*

minuscule compared with, for example, annual landings of >1 million tonnes (mean for years 2000–2011) from a single stock of Atlantic herring (Clupea harengus) in the northeast Atlantic fisheries[ix3].

In 2002, total catch of wild fish in the Arctic amounted to 7.26 million tonnes[x]. This constitutes around 10 % of the world catch of fish. Total catch in 2002 was somewhat lower than the average over the period 1970–2000, but variations among species are large, especially related to the fisheries of cod, capelin and herring.

In addition to the marine wild fish catch, there is an Arctic fishery of shrimps and snow crab. In 2002, 290 000 tonnes of shrimps and 65 000 tonnes of snow crabs were landed. The Arctic catch of these two species was 5.3 % of the global catch of crustaceans.

In 2002, total Arctic fish farming of salmon and trout was around 100 000 tonnes or 7.7 % of the world aquaculture production of these species. Since then, aquaculture has greatly developed and total production has greatly increased.

Species	North-east Atlantic (Barents and Norwegians Seas)	Eastern Bering Sea	Western Bering Sea	Central North Atlantic (Iceland, Greenland and Feroe Islands)	North Atlantic (Newfoundland and Labrador Sea)	Total
Capelin	0.64			1.12	0.02	1.78
Herring	0.83		0.05	0.27	0.01	1.16
Cod fish						3.78
Northeast Atlantic cod	0.49[1]			0.25		
Saithe North of 62°N	0.15			0.42[2]		
Haddock, saithe					0.01	
Pollack		1.50	0.40			
North-east Arctic haddock	0.08					
Blue whiting				0.28		
Greenland halibut	0.01			0.04	0.04	0.09
Flatfish		0.06	0.01			0.07
Other groundfish		0.20				0.20
Pacific salmon		0.04	0.02			0.06
Others	0.01	0.04	0.04	0.23		0.32
Total wild fish	**2.21**	**1.84**	**0.52**	**2.61**	**0.08**	**7.26**
Shrimps	0.06			0.13	0.10	0.29
Snow crab		0.01[3]		0.01	0.05	0.07
Total crustaceans	**0.06**	**0.01**		**0.14**	**0.15**	**0.36**
Aquaculture (salmon, trout...)	**0.09**			**0.01**		**0.10**

[1] Includes coastal cod. [2] May contain other species. [3] Includes king crab and Tanner crab.

Table 2. Marine fishery in the Arctic. 2002. Million tonnes[4]

Analysis of 2006 catches (the more recent data available) for the 18 Arctic LMEs provided by the Sea Around Us Project website[xi] confirm that more than 90 % of so called "Arctic fisheries" take place in Pacific (52,5 %) and Atlantic (40,3 %) gateways of the Arctic Ocean and Arctic Basin Seas (See Annex 2 "Arctic Fishery Statistics 2006" for detailed data analysis).

	15 Arctic LMEs	10 Arctic Bassin LMEs	Atlantic Gateway (AG)	Pacific Gateway (PG)

[3] http://onlinelibrary.wiley.com/doi/10.1111/gcb.12395/pdf

	Catches (tons)	Catches (%)	Catches (tons)	Part of group catches (%)	Part of Arctic LMEs (%)	Catches (tons)	Part of group catches (%)	Part of AG (%)	Catches (tons)	Part of group catches (%)	Part of PG (%)
Cods and hakes	2 339 519	45.4	55 230	2.4	14.9	998 491	42.7	48.1	1 285 798	55.0	47.5
Herrings	959 327	18.6	8 602	0.9	2.3	875 836	91.3	42.2	74 889	7.8	2.8
Salmonids	333 323	6.5	6 821	2.0	1.8	0	0	0	326 502	98.0	12.1
Flatfishes	117 556	2.3	42 618	36.3	11.5	14 522	12.4	0.7	60 416	51.4	2.2
Redfishes	52 389	1.0	40 649	77.6	10.9	11 740	22.4	0.6	0	0	0
Capelin and smelts	11 079	0.2	11 079	100	3.0	0	0	0	0	0	0
Mixed groups	732 421	14.2	0	0	0	106 806	14.6	5.2	588 015	80.3	21.7
Crustaceans	199 473	3.9	143 391	71.9	38.6	24 987	12.5	1.2	21 562	10.8	0.8
Molluscs	141 929	2.8	15 859	11.2	4.3	0	0	0	126 070	88.8	4.7
Total catches	**5 150 409**		**371 355**	**7,2**		**2 073 767**	**40.3**		**2 0705 287**	**52.5**	

Table 3. Marine fishery in the Arctic. 2006

Consequently, nearly two thirds of total catches are realized on cod and cod-like species (45.4 %) and on herrings (18.6 %), which are boreal species living in cold temperate waters. Those two main targeted species groups are particularly though to be impacted by the climate change, and expected to move northward in the near future, accompanying the sea ice retreat.

Diadromous fishes (i.e. Salmonids) are the third most targeted fish species group by fisheries, but 98 % of catches are realized in Bering Sea, in coastal waters and estuarines or rivers. Salmonids are also targeted by Aboriginal Peoples for subsistence (Inuit in Alaska and Canada) and most of catches are unreported. Moreover, Canada considering Inuit subsistence fishery as non-commercial does not include that catch in it report to FAO and RFMO's.

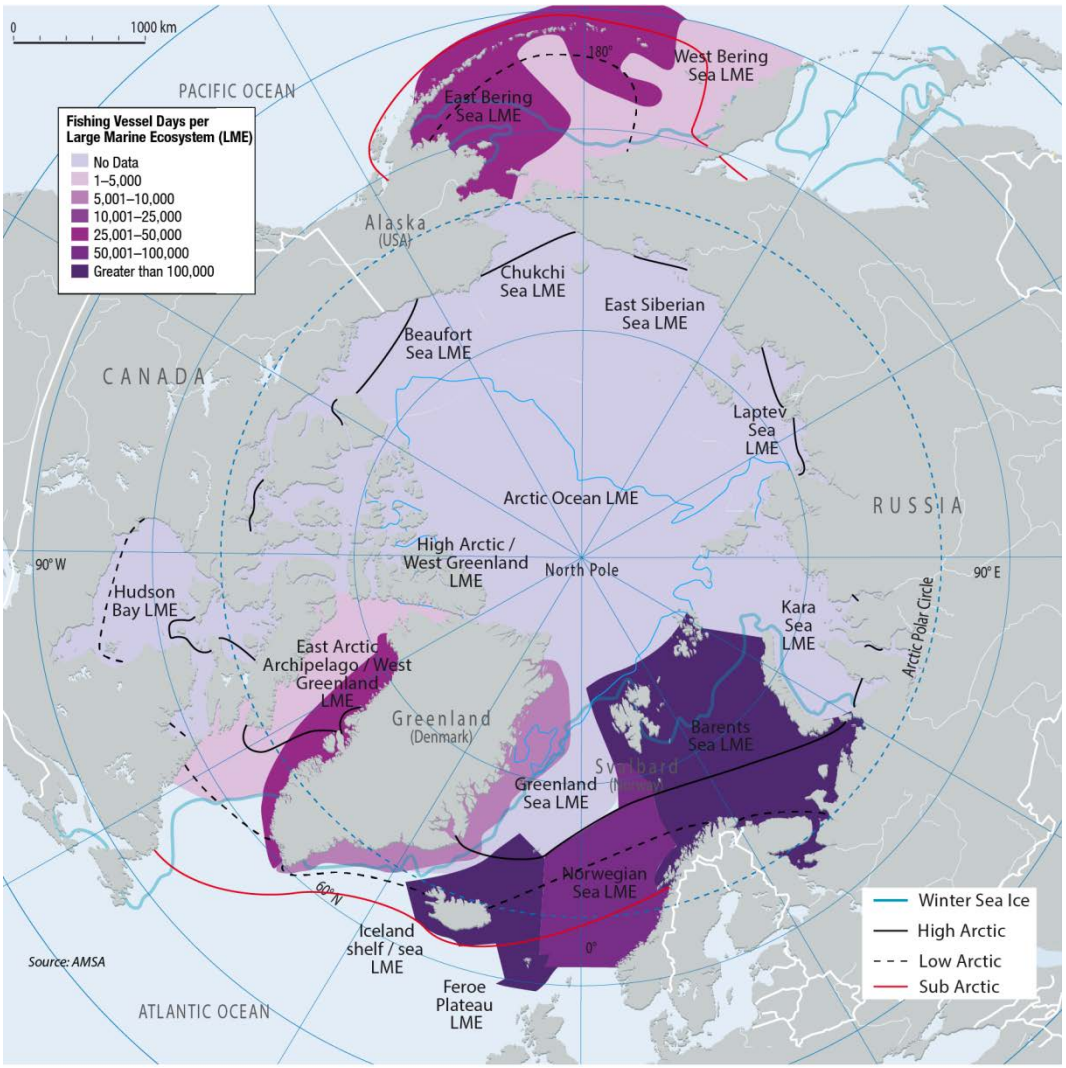


Figure 5. Arctic fishing activity[xii]

The reported fishing vessel activity takes place in a few key areas, including the Bering (East Bering: 30.5 % of total catch; West Bering: 22 %), Barents (14.6 %) and Norwegian (26.2 %) seas. Highest fishing vessels concentrations (fishing vessel day) are in the Atlantic gateway (Barents-Norwegian Seas) and Northeast Atlantinc (Iceland Sea and Faroe Plateau), two regions operated by Norwegian, Russian, Iceland and EU fishing fleets, using large "high-tech" fishing boats.[4]

Bering Sea, which presents the higher catch level (52.5 %), is caracterised by an important coastal and estuarine fishing activity targeting salmonids and a very productive offshore "high-tech" fishing fleets, mainly US fleets (50 % of Bering Sea catches) targeting cod and cod-likes species.

The west coast of Greenland presents also an important fishing activity, where small coastal fishing boats dominates, giving a high fishing vessel activity but for a relatively poor rentability as catches represents less than 5 % of total Arctic catches.

[4] http://www.arctis-search.com/Fishing+Vessels+in+the+Arctic

Very limited fishing activity occurs in the Arctic Ocean and the Canadian Arctic Archipelago, mostly small-scale food fisheries realized by Indigenous coastal communities for subsistence. Most of this subsistence activity is unreported, as well as catches they realize.

Since fishing in the Arctic takes place up to the ice edge, not in close ice pack conditions, operations are in completely or seasonally ice-free or low ice concentration areas and opportunistic in nature.

	Arctic Ocean and Arctic Basin Seas										Atlantic Gateway		Pacific Gateway			Catch by country	
	AO	WGS	BB/HS	HB	AA	BfS	ESibS	LapS	KaraS	GrS	BrtsS	NorwS	ChukS	EBerS	WBerS	in tons	%
Canada			23 532	1 075	275	26								4 853	17 969	47 730	0,9%
Greenland		149 685	26 432							9 615						185 732	3,6%
Iceland		863								25 711	22 011	89 306				137 891	2,7%
Norway	145		2						321	17 037	320 859	783 711				1 122 075	21,8%
Russia		3 155	29				3 239	3 304	615	30 603	311 425	284 378	95	25 122	281 656	943 621	18,3%
USA		41 985	2 028			246							1 195	1 498 953	79 476	1 623 883	31,6%
Denmark (Cont)										464		14 766				15 230	0,3%
Denmark (Feroes)		305							12	5 682	28 909	103 849				138 757	2,7%
Sweden	443															443	0,0%
Estonia												284				284	0,0%
France											3 034	4 904				7 938	0,2%
Germany		747	1						1	4 721	6 254	15 390				27 114	0,5%
Latvia										507	35	248				790	0,0%
Lithuania	1								4		1 221	650				1 876	0,0%
Portugal		623														623	0,0%
Spain		1 237	4				359	194	132	271	411					2 608	0,1%
UK									1	1 204	9 917	14 071				25 193	0,5%
China														25 723	418 411	444 134	8,6%
Hong-Kong															15 542	15 542	0,3%
Japan	30								7					11 701	241 334	253 072	4,9%
Korea (South)														2 959	51 214	54 173	1,1%
Philippines															242	242	0,0%
Taiwan															28 839	28 839	0,6%
Others	10	3 358	635						1	6 014	19 734	38 397			3	68 152	1,3%
Total	629	201 958	52 663	1 075	275	272	3 598	3 498	1 094	101 829	723 810	1 349 954	1 290	1 569 311	1 134 686	5 145 942	

Table 4. Arctic fishing activity by country

Arctic countries are in italic; EU countries in dark blue. AO: Arctic Ocean LME; WGS: West Greenland shelf; BB/HB: Baffin Bay/Davis Strait LME; HB: Hudson Bay LME; AA: Arctic Archipellago LME; BfS: Beaufort Sea LME; ESibS: East Siberian Sea LME; LapS: Laptev Sea LME; KaraS: Kara Sea LME; GrS: Greenland Sea LME; BrtsS: Barents Sea LME; NorwS: Norway Sea LME; ChukS: Chukchi Sea LME; EBerS: East Bering Sea LME; WBerS: West Bering Sea LME. (source: seaaroundus.org)

If Arctic countries are the main fishing operators in their EEZ waters, they also operate in their neighbours' EEZ. One third of catches of Russian Federation (67 %) and Canada (62.4 %) are realized outside their own EZZ while USA (92.4 %) and Norway (98.4 %) perform more than 90 % of their catches inside their EEZ. Greenland restrein its fishing activity inside its EEZ waters, which extend largely inside the Baffin Bay/Davis Strait LME.

USA is the most important fishing country in the Arctic, with a total catch of 1.6 million tons (31.6 % of total catches), followed by Norway (1.1 Mt; 21.8 %) and Russian Federation (0.9 Mt; 18.3

%). But the true US "Arctic fishing" in very low (7.6 %) and mostly performed on the West Greenland shelf as Beaufort Sea is only exploited by Alaska Inuit communities for subsistence use.

When considering the Arctic Basin seas, Greenland is the most important "true Arctic fishing" operator, tolalising 50 % of total Arctic Basin catches (185,732 t), followed by USA (12 %) and Russian Federation (11 %), the former exploiting mostly West Greenland shelf and the last the East Greenland shelf and Sea. EU countries are responsible of just 4.6 % of catches, the half being done by the Danish fleet of Feroe Islands.

Very few fishing vessels realy operate in the Arctic Ocean itself, the most part being ice-covered. Sweden seems to be the most important operator since 2004, totalizing 70 % of total catches in 2006, followed by Norway with 23 %. Arctic Ocean fishing depends largely of sea ice extent and can be made only on an opportunistic mode during the few summer months.

Despite the increasing open water season and ice free surface since 2007 in the Arctic Ocean, fishing activity stays at very low level with 480 tons in 2008 and 589 tons in 2010 according the FAO statistics.

II.3 Impact of Climate Change on Arctic marine ecosystems

Climate change is by far the most serious threat to Arctic biodiversity and exacerbates all other threats.

If the onset of such a seasonal Antarctic-like sea ice variability in the Arctic, with a sea ice covered Ocean in winter and ice-free Ocean in summer, can't be predicted with certainty (5 to 70 years depending of the models and scenarios), we can be sure that Arctic seals as well as the all Arctic marine biodiversity will be faced to that seasonal sea ice shift before the end of the century. The shifting between the normal Arctic system (a huge winter arctic sea ice extent covering all the Arctic seas and northern most parts of subarctic seas and a permanent summer melting resistant sea ice covering half of winter extent) to an Antarctic-like system has already begun, impacting coastal and continental shelves waters of Arctic seas, the most productive parts of the Arctic ocean where arctic seals live[5].

The impacts of climate change include a long list of changes in the physical environment, which will have profound effects on Arctic biodiversity. The conditions will vary spatially, but aside from temperature increases, the most pronounced changes are likely to include[xiii]:

- accelerating loss of sea ice cover, especially multi-year ice, and
- earlier and more variable sea ice and snow melt
- increased sea surface waters temperature
- reduced exchanges between deep and surface waters / increased stratification
- later onset of autumn sea ice formation and snow precipitations
- disappearance of coastal ice shelves

[5] http://www.rcinet.ca/en/2013/10/17/assessing-pan-arctic-biodiversity-for-policy-planners/

http://www.arcticbiodiversity.is/index.php/the-report/report-for-policy-makers/key-findings

http://arcticclimateemergency.com/ecologyspecies/4576612718

- more frequent and severe extreme events (icing, erosion, storms, flooding, fire)
- ocean acidification.
- increased precipitation with more winter snow
- increased freshwater discharge into the Arctic Ocean
- increased periods of summer drought but with more severe rains
- flooding of low coasts
- coastal erosion
- increased frequency of winter thaw-freeze events including rain-on-snow resulting in ice crust formation
- earlier drying of ponds
- disappearance of perennial snowbeds
- thawing permafrost and thermokarst development with drainage of peatlands and ponds or establishment of new ponds

The extent to which these effects are expected to develop varies between projections, but the overall direction is clear, and several of them are already evident now.

Because of the rapidity of change, the dominant response of many Arctic species to climate change is more likely to be by phenotypic adaptation rather than genotypic adaptation[xiv]. *This may involve northward displacement of whole habitats resulting in a reduction in the area occupied by Arctic ecosystems – particularly those characteristic of the high Arctic – because of the reduction in the available surface area when moving north towards the pole.*

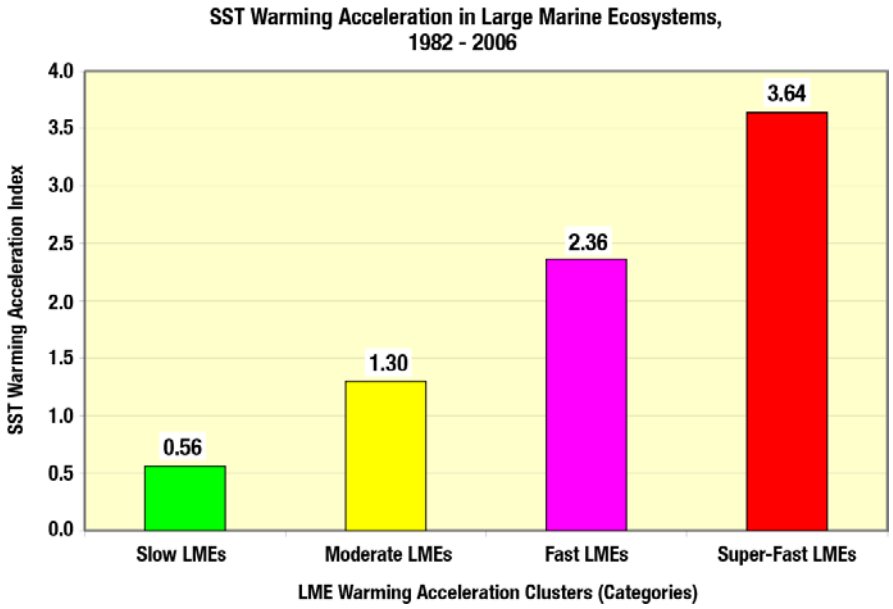
In the marine environment, the northward expansion of sub-Arctic species takes place via dispersion and transport of planktonic larvae or adult animals. This northward expansion will modify the whole arctic food web composition and possibly may have dramatic effects on arctic seals targeted fish species.

Considering Sea surface temperature (SST) change, sub-arctic Seas (ie. Norwegian Sea, Iceland shelf, Newfoundlandand Labrador Seas for North Atlantic, and Okhostk Sea and West Bering Sea for North Pacific) have been classified in 2009 as moderate to fast warming exosystems, and Pacific and Atlantic Gateways as slow warming ones[xv]. Arctic Ocean and Arctic Basin Seas have not been assessed because of their insufficient yields, but regarding the sea ice melt observed rate during the same period and the last decade most of Arctic Seas LME have to be considered as moderately (Arctic Ocean and northern parts of adjacent Seas) to Fast or Super-Fast warming ecosystems, specialy for Canadian Arctic Archipelago, Chukchi and Beaufort Seas and southern parts of East Siberian, Laptev and Kara Seas (Regions corresponding to the Northwest and Northeast sea routes regularly open to summer navigation since 2007)[6].

[6] http://www.caff.is/publications/doc_download/206-arctic-biodiversity-assessment-2013-chapter-1-synthesis

LMEs, rates of warming, 5-yr. mean fisheries biomass yields, adjacent to developping or developped countries, status of stocks exploitation

FAST WARMING LMEs	**Adjacent countries developed**	**increasing** fisheries biomass yield trend	5-yr. mean fisheries biomass in metric tons	Fisheries biomass yield status from SAUP: Fully exploited, overexploited
Norwegian Sea LME	developed	increasing	1,643,808	2% fully exploited, 23% overexploited
Iceland Shelf LME	developed	increasing	1,359,767	0% fully exploited, 80% overexploited
Faroe Plateau LME	developed	increasing	460,686	83% fully exploited, 10% overexploited
West Greenland Shelf LME	developed	increasing	138,369	90% fully exploited, 0% overexploited
Newfoundland/Labrador Shelf	developed	decreasing	683,480	55% fully exploited, 10% overexploited
MODERATELY WARMING LMEs	**Adjacent countries developing**	**increasing** fisheries biomass yield trend	5-yr. mean fisheries biomass in metric tons	Fisheries biomass yield status from SAUP: Fully exploited, overexploited
Sea of Okhotsk LME	developing	increasing	1,472,394	10% fully exploited, 78% overexploited
West Bering Sea LME	developing	decreasing	508,804	1% fully exploited, 79% overexploited
East Greenland Shelf LME	developed	increasing	73,932	6% fully exploited, 23% overexploited
SLOWER WARMING LMEs	**Adjacent to developing countries**	**decreasing** fisheries biomass yield trend	5-yr. mean fisheries biomass in metric tons	Fisheries biomass yield status from SAUP: Fully exploited, overexploited
Barents Sea LME	developing	decreasing	980,781	0% fully exploited, 60% over exploited
East Bering Sea	developed	decreasing	1,454,881	62% fully exploited, 28% overexploited
Arctic LMEs yields are too low for trend analysis				
Chukchi			0	
East Siberian			0	
Beaufort Sea			8	
Hudson Bay			50	
Kara Sea			295	
Laptev Sea			0	
Arctic Ocean			242,913	



High latitudes LMEs are more intensively impacted by climate change than lower latitude ones.

II.4 Impact of Climate Change on Arctic fish

It is thought that production of oceanic phytoplankton (Primary production) in the Arctic is expected to increase in response to declines in summer sea ice but this increase in production may be offset by declines in the spatial extent of ice algal blooms, and changes in oceanic species composition to a smaller size. Secondary production (herbivorous zooplanton) is likely to increase with a greater fraction of the annual production being grazed by zooplankton. Warmer ocean conditions and shifts in advection may change the species composition of zooplankton in the Arctic. The size and lipid content of dominant copepods may also change and may increase the production of smaller zooplankton. Temporal mismatches between the onset of spring blooms and peak hatch dates may occur[7]. Whether these changes to trophic energy pathways (primary and secondary productions fluxes) will be sufficient to support sub-Arctic fish and shelfish species is uncertain.

As fish spawning closely depends on water temperature conditions, Arctic Ocean warming will impact directly fish reproduction and therefor their populations density and distribution. Such geographic distribution shifts to temperature differ among fish species. Some species are deemed to have a strong potential for northward displacements such as the boreal beaked redfish (Sebastes mentella) and the Arctic-boreal Bering flounder (Hippoglossoides robustus)[xvi].

The boreal Atlantic cod (Gadus morhua) has already become abundant north in the Barents Sea (latitude ~80° N), and industrial fisheries are beginning to harvest the Arctic shelves around Svalbard archipelago[xvii].

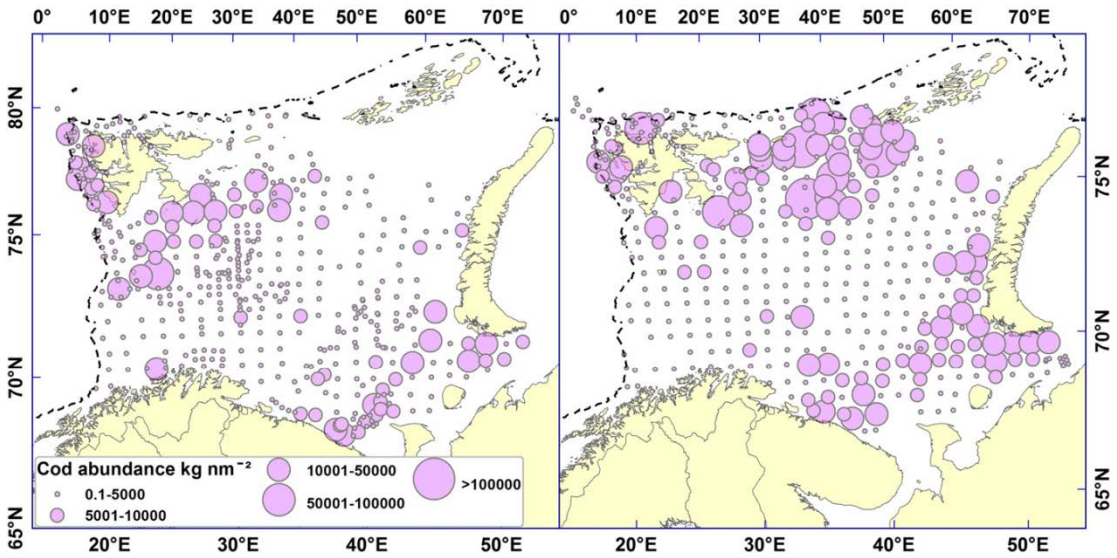
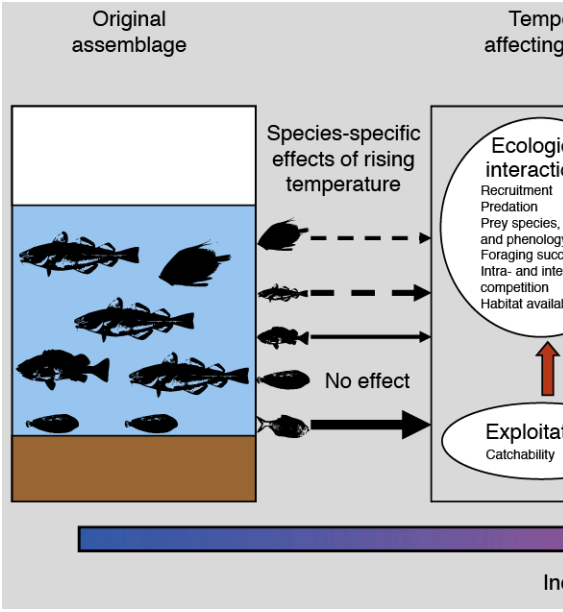


Figure ? Autumnal Atlantic cod distribution and abundance in 2007 (left) and 2012 (right) in Barents Sea[xviii]

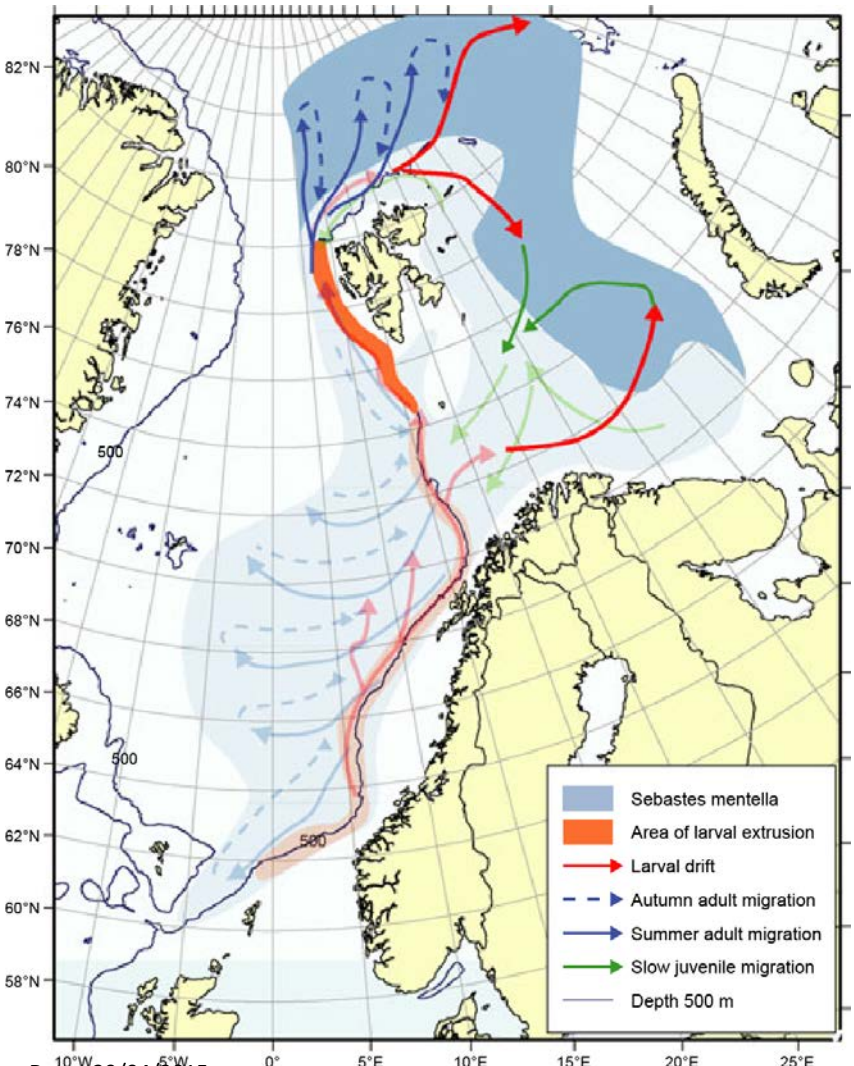
[7] https://www.imr.no/filarkiv/2013/04/potential_movement_of_fish_and_shellfish.pdf/nb-no

Truely Arctic species, like polar and arctic cods, are more vulnerable to warming arctic waters because their habitat, ice covered waters, is retracting itself.

Species differential response to changing temperatures may produce dramatic changes in local fish assemblage community, relative abundance of each species largely influence the global biodiversity of the ecosystem[xix].



Temperature-dependant factors and fish assemblage shifting[xx]
Species-specific differences in the overall response to temperature are represented by arrow style (dashed: abundances decreasing; solid: abundances increasing; arrow width indicates differences in the strength of response).



Hypothesized expansion of the distribution area of beaked redfish under future ocean climate in the Barents Sea and surrounding areas. Shaded areas and arrows indicate current distribution areas and migration routes. Plainc olor areas and arrows indicate the potential expansion of distribution and migration routes.

Fisheries exploitation patterns are also changing as harvested species move poleward into hitherto unfished parts of the Arctic seas[xxi].

Predicting the consequences of changes in the physical environment and potential food availability for fish and associated fisheries, when many detailed aspects of species' ecological and physiological constraints are still not known, is very challenging[8].

Assessment of the expected movements of 17 fish and shellfish stocks or stock groups currently found in the Barents, Norwegian and Bering Seas to climate change was qualitatively evaluated by examining the potential impact of climate change as mitigated by the adaptive capacity of each species[15], and identifyed three categories:

"*Five stocks or stock groups were thought to have a low potential to expand in, or move into, the Arctic: walleye pollock, northern rock sole, Pacific cod (Gadus macrocephalus), Atlantic cod (Gadus morhua), Pacific ocean perch (Sebastes alutus). Six stocks were potentially able to expand or move into the Arctic. Six stocks, polar cod, snow crab, Bering flounder (Hippoglossoides elassodon), Greenland shark (Somniosus microcephalus), Arctic skate (Amblyraja hyperborea), and beaked redfish (Sebastes mentella), had a high potential to expand in, or move into, the Arctic*"[9].

"*Future expansion or movement of sub-Arctic commercial fish stocks from the Norwegian or Barents Seas into the Arctic*" was judge as "*more likely because the inflow of warm Atlantic water is stronger and the open water connection with the Arctic Ocean provides greater access to the region*" than for Bering Sea because "*shallow depth of Bering Strait, coupled with the expected persistence of a demersal cold pool in the northern Bering Sea and Chukchi Seas, may deter movement of Pacific Ocean perch (Sebastes alutus), Pacific cod (Gadus macrocephalus) and walleye pollock into the Arctic. Northern rock sole, was less likely to move or expand into the Arctic because of its restricted diet*".

In all cases, availibility of prey ressources and sufficient temperature are limitant factors to the expansion of arctic-boreal and boreal species in Arctic Basin waters, these fishes having higher metabolic rate than arctic species.

[8] P. 7, http://www.mccip.org.uk/media/22483/2013arc_sciencereview_13_fish_final.pdf

9 https://www.imr.no/filarkiv/2013/04/potential_movement_of_fish_and_shellfish.pdf/nb-no

The use of AquaMaps[xxii] ecological niche model-based maps of currently known natural occurrence of marine Arctic and Boreal fish species compared with their modelled 2100 distribution 2100 map based on IPCC A2 emissions scenario, show an important mouvement northward of most of the 815 identified fish species of the Arctic seas. But just 20 % (159 species) of them are supposed to enter or extend their current distribution in the Arctic Ocean itself.

Distribution in the Arctic Ocean in 2100	Arctic Species	Arctic-Boreal species	Boreal species	Worldwide species	Total
Expansion	32 / 48 %	25 / 66 %	95 / 17 %	7 / 4 %	159 / 20 %
Contraction	9 / 13 %	6 / 16 %	1 / 0.2 %	0	16 / 2 %

Predicted changing of Arctic Seas fish species in 2100
(Source: AquaMaps.org)

The predicted range evolution is quite different for fisheries targeted species, with 40 % (25 species) entering or expending their current range in the Arctic Ocean as just 2 species (Arctic and Polar cod) contracting, dramatically, their range in 2100.

Distribution in the Arctic Ocean in 2100	Arctic Species	Arctic-Boreal species	Boreal species	Worldwide species	Total
Expansion	4 / 66 %	5 / 83 %	16 / 32 %	0	25 / 40 %
Contraction	2 / 33 %	1 / 17 %	0	0	3 / 5 %

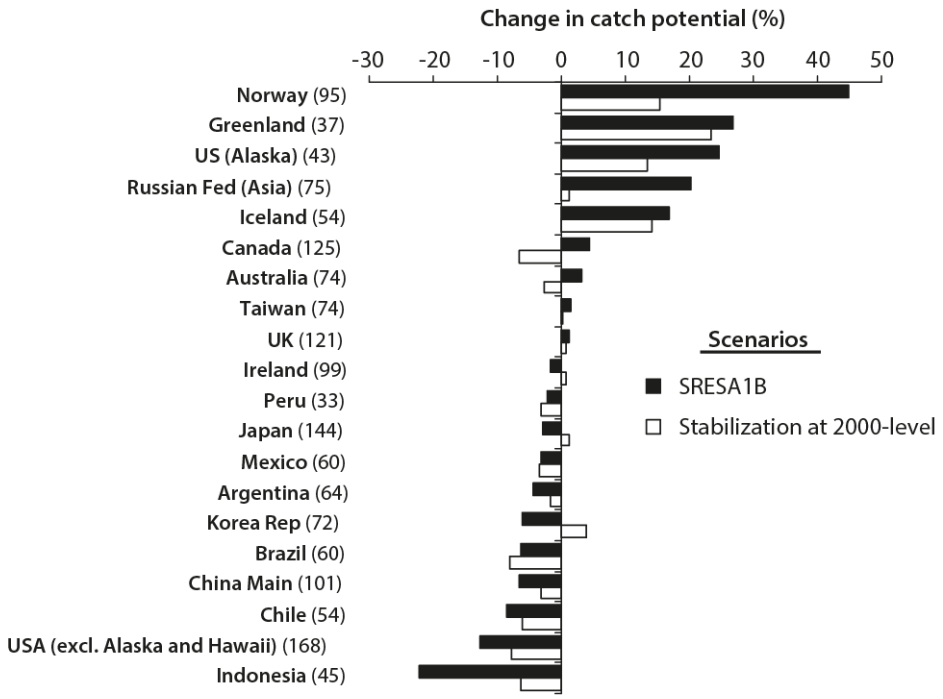
Predicted changing of Arctic Seas targueted fish species in 2100
(Source: AquaMaps.org)

For Arctic and Arctic-Boreal, as most of targueted species are anadromous fishes exclusively fished in rivers and estuarines, during their migration back to freshwaters reproduction grounds, such an Arctic Ocean expansion range will have nearly no noticeable effect on commercial fisheries. But for Boreal species, which are mostly caught in marine waters, such a shift may generate an important change in fishing effort special distribution with repercutions on costs and rentability.

II.5 Impact of Climate Change on Arctic fisheries

Models have been used to prospect possible evolution of some fish stocks of key interest and results tend to confirm a global shift northward of targeted species.

The comparison of global catches changes predicts a highly possible large-scale redistribution of catches, with an average of 30 to 70 % increase in high latitude regions (ie. Arctic LMEs, see figure above), and a drop of up to 40 % in the tropics. Moreover, maximum catch potential declines considerably in the southward margins of semienclosed seas while it increases in poleward tips of continental shelf margins. Such changes are most apparent in the Pacific Ocean[xxiii].



Projected changes in 10-year averaged maximum catch potential from 2005 to 2055 by the 20 Exclusive Economic Zone regions with the highestcatch in the 2000s.

The numbers in parentheses represent the numbers of exploited species included in the analysis.

In green, google search shows strong similarities with : http://www.fisheries.ubc.ca/webfm_send/134

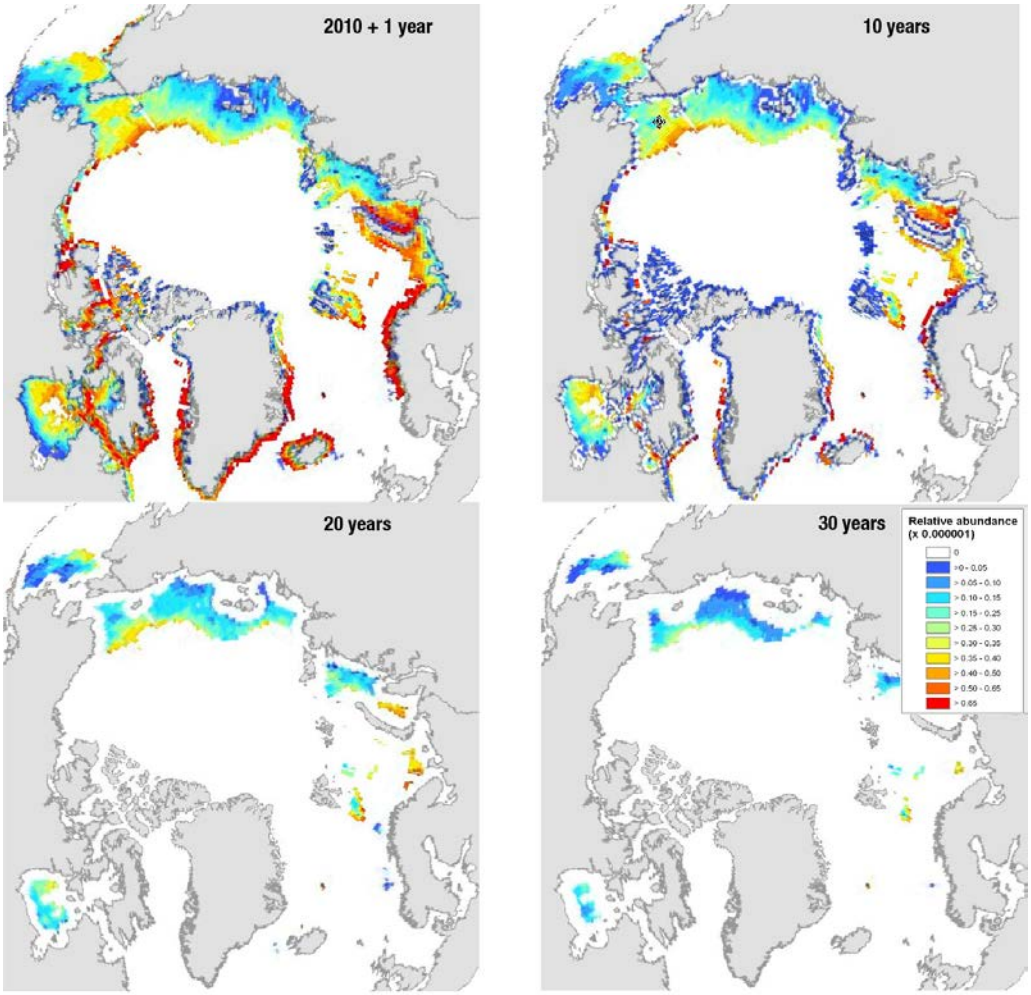
Using bioclimate envelop (sea water temperature, bathymetry, habitats and distance from sea ice) on some species of commercial interest, polar cod and Atlantic cod to predict their relative abundance through changes in population growth, portality, larval dispersal and adult movement[10].

Paragraph below is found p31 (or 27) in : http://www.fisheries.ubc.ca/webfm_send/134

Polar cod was found to be sensitive to the warming scenarios and the model predicted that it would be extirpated in most of its range even under the milder warming scenario (see figure below). This is due to its occurrence in the Arctic Ocean, which largely precludes it from moving northwards. Polar cod was predicted to be extirpated around Greenland and its abundance was largely reduced in other parts of the Arctic Ocean after 30 years of hypothetical warming[11].

[10] http://www.fisheries.ubc.ca/webfm_send/134

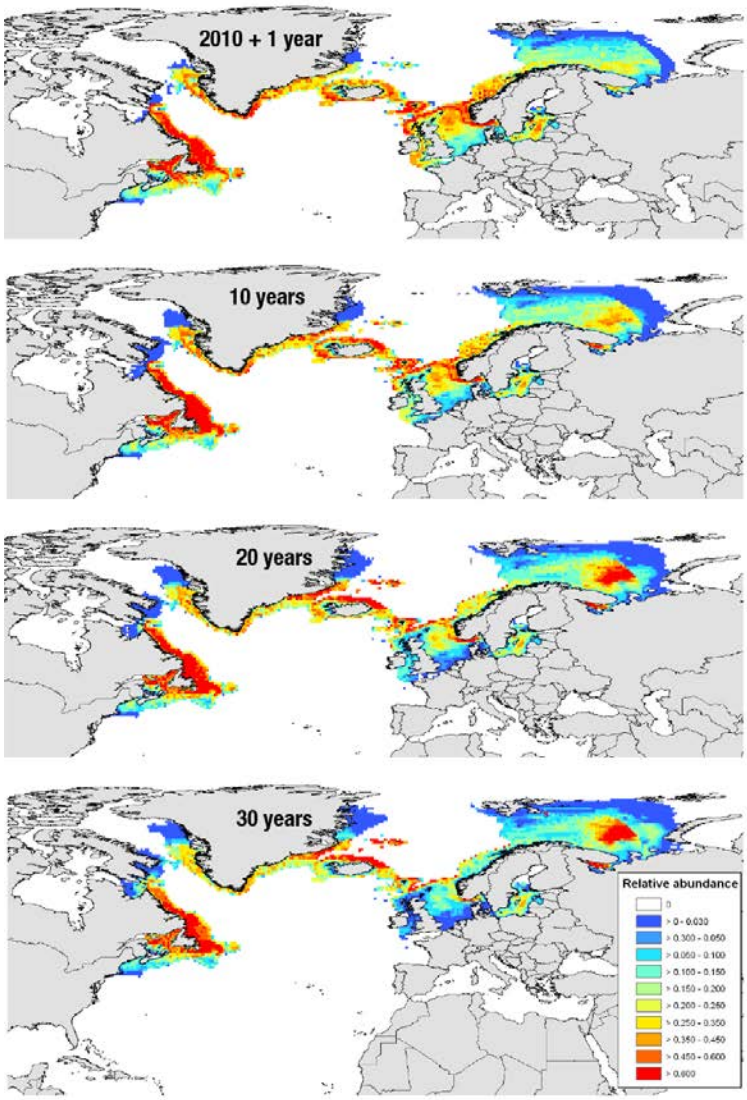
[11] p31 (or 27) in : http://www.fisheries.ubc.ca/webfm_send/134



Simulated changes in distribution of polar cod after 1 year (upper left), 10 years (upper right), 20 years (lower left) and 30 years (lower right) under hypothetical scenarios of ocean warming and retreating sea ice edge at a rate of 5 km per year. Polar cod is extirpated from most of its range in 30 years.

A strong global warming scenario (scenario 2) resulted in a general northward shift of distribution of Atlantic cod (see figure below). In the northwest Atlantic, our model predicted that the abundance of the southern cod stocks (Georges Bank, Gulf of Maine, and Scotian Shelf) would decline. In the northeast Atlantic, relative abundance of cod declines in the North Sea, Irish Sea, Celtic Sea and Norwegian Sea. On the other hand, the relative abundance of the Icelandic, Faroe Island and Barents Sea cod stock increased. Also, the distribution of cod extends further into the Arctic as the ice sheet retreats[12].

[12] p33 (or 29) in : http://www.fisheries.ubc.ca/webfm_send/134



Simulated changes in distribution of Atlanticcod after 1 year, 10 years , 20 years and 30 yeasr under hypothetical scenarios of ocean warming and retreating sea ice edge at a rate of 5 km per year (scenario 2).

To summarize, Climate change impact on Arctic fishery will highly probably accelerate the Northward shift of targeted boreal fish and selfish species currently observed in some species, and modify the species assemblage in most of Arctic LMEs, specially the Pacific and Atlantic Gateways (Bering Sea, Norwegian and Barents Sea), three of the most productive seas of the world. This geographical distribution shift associated with sea ice retreat will open new fishing grounds, which will be located much farer from main fishing ports, in waters uncovered by existing RFMOs. These changes will aslo modify targeted species population dynamics and fishable stocks.

III. The EU and Arctic Fisheries

III.1 The EU and the Arctic Fisheries

In the introductory paragraph of its 2008 Communication, The European Commission has delivered an abstract on "The EU and the Arctic region":

"The European Union is inextricably linked to the Arctic region by a unique combination of history, geography, economy and scientific achievements. Three Member States — Denmark (Greenland), Finland and Sweden — have territories in the Arctic. Two other Arctic states — Iceland and Norway — are members of the European Economic Area. Canada, Russia and the United States are strategic partners of the EU. European Arctic areas are a priority in the Northern Dimension policy. Beyond areas of national jurisdiction, the Arctic Ocean contains parts pertaining to the high seas and the seabed managed by the International Seabed Authority" (Ibid).

Fisheries activities are *mentioned as one of the relevant sectors both in the Commission's Communication of 2008 and the subsequent Council's Conclusion of 2009 on the Arctic region and on Arctic issues*[13]. Both documents express the EU's aim to exploit Arctic fisheries resource at sustainable levels whilst respecting the rights of local coastal communities.

In paragraph 3.2 of the Commission's Communication on the Arctic Region[14], we can read:

"Policy objective

The EU's main objective is to ensure exploitation of Arctic fisheries resources at sustainable levels whilst respecting the rights of local coastal communities.

Proposals for action:

–Put in place a regulatory framework for the part of the Arctic high seas not yet covered by an international conservation and management regime before new fishing opportunities arise. This will prevent fisheries developing in a regulatory vacuum, and will ensure fair and transparent management of fisheries in accordance with the Code of Conduct for Responsible Fishing. In principle, extending the mandate of existing management organizations such as NEAFC is preferable to creating new ones. Until a conservation and management regime is in place for the areas not yet covered by such a regime, no new fisheries should commence."

As far as new Arctic fisheries are concerned, we can summarize the Commission's Communication with the three following principles:

1. Put in place a regulatory framework of the part of the Arctic High seas not yet covered by an international conservation and management regime. In accordance with the Code of Conduct for Responsible Fishing.

13 ://www.swp-berlin.org/fileadmin/contents/products/arbeitspapiere/Rff_WP_2010_02_ks.pdf

14 http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52008DC0763

2. In principle, extending the mandate of existing management organisations such as NEAFC is preferable to creating new ones.

3. No new fisheries should commence until a new conservation and management regime is in place.

In paragraph 10 of the 2009 Council Conclusions on Arctic Issues, we also read:

The Council notes that in the implementation of the Integrated Maritime Policy (IMP) special attention will be paid to the Arctic and underlines that harvesting of Arctic marine living resources should be managed on the basis of scientific advice as part of an ecosystem perspective. It stresses the need to promote a precautionary approach to new fishing activity in Arctic high seas, as well as measures for protecting marine biodiversity in areas beyond national jurisdiction. The Council expresses its readiness to consider a proposal to put in place a regulatory framework for the part of the seas not yet covered by an international conservation system by extending the mandate of relevant Regional Fisheries Management Organisations or any other proposal to that effect agreed by the relevant parties. Until such a framework is in place, the Council favours a temporary ban on new fisheries in those waters.

As far as new Arctic fisheries are concerned, we can summarize the 2009 Council's conclusions with four main guiding principles:

I. Special attention will be paid to the Arctic in the implementation of the IMP

II.a Promoting precautionary approach to new fishing activity in Arctic High seas

II.b Promoting measures for protecting marine biodiversity in areas beyond national jurisdiction.

III. Put in place a regulatory framework for the part of the seas not yet covered by an international conservation system

III.a Extending the mandate of relevant Regional Fisheries management Organisations or any other proposal to that effect agreed by the relevant parties.

IV. Temporary ban on new fisheries in those waters.

Principle 1 is conceptually equivalent to principle III on the condition that "the part of seas not yet covered by an international conservation system" has the same meaning as "Arctic High seas". Principle 2 is equivalent to principle III.a. In the former statement, "In principle" suggest that other options might have to be considered, as it is clearly mentioned in the latter statement. Principle 3 is equivalent to principles I and IV, the ban representing the legal way of preventing new fisheries in unregulated arctic waters.

III.2 The European Common Fisheries Policy.

EU fisheries policy is an exclusive competence of the EU. The Lisbon Treaty explicitly mentions a common fisheries policy (CFP) in Article 38(1), Treaty on the Functioning of the European Union (TFEU). This means that all decisions are taken at the EU level. Member States cannot intervene in fisheries management unless they are explicitly delegated back the powers to do so. The Common Fisheries Policy (CFP) provides the framework for European and national fisheries management activities. Article 1(1) of the Basic CFP Regulation describes the scope of the CFP as encompassing: « *conservation, management and exploitation of living aquatic resources, aquaculture, and the processing and marketing of fishery and aquaculture products* ».

III.3 The EU as fishing actor in the Arctic

Reminding that the EU has not direct access to Arctic seas (defined as north of latitude 66° North) as Greenland does not belong to the EU anymore since 1985, we needs to identify the role of the EU as fishing actor and as a trade partner for fish trade. It will be of great importance to evaluate the relevance of Arctic Fishing for the EU compared to other fishing countries and the EU's position as economic fish market for Arctic countries. According to a recent study (Rudloff, 2010), the economic relevance of Arctic Fisheries for the EU (catches and trade) could be summarized in the following way:

- The EU only holds an unimportant share of all Arctic catches;
- The fisheries sector in the EU is of minor overall economic relevance;
- The EU can be characterized as strong or even dominant trade actor for arctic fish trade

III.4 The EU and fishery regimes in the Arctic

Fisheries governance has international, national and local dimensions. It will be of great importance to examine the involvement of the EU in relevant regimes for Arctic fisheries and trade:

- The EU is member of all relevant regimes at UN level (UNCLOS, Fish Stock Agreement, IPO-IUU..) despite one specific for the Bering sea.
- At regional levels, the EU is member of all spatially defined RFMOs (NEAFC, NASCO) and all fish-specific ones but one (NPFAC).
- Additionally, the EU adopted some bilateral agreements (Iceland/EU, Norway/EU, Greenland/EU…)

According to the definition of Arctic Seas, The EU does not have direct coastal access. This subsequently limits the EU fishing rights in the current situation: The EU receives rights either by grant from Arctic countries to fish within their EEZ or by being allocated rights within an RFMO area as far as the High Sea is concerned. For straddling stocks even these rights in the High Seas depends of the first decision of coastal States on their fishing volume what determines the residuum accessible other countries.

IV. The NEAFC enlargement project

IV.1. Elements of history of international fisheries governance

According to a recent OECD report on IUU fishing[xxiv], we can trace back the present time with four major phases in the international fisheries governance:

- Free access till 1979
- Gradual enclosure of High Seas waters till 1900
- Sustainable management in the 90s
- Measures against illegal, unreported and unregulated fisheries (IUU)

IV.2 Regional Fisheries Managment Organizations

RFMOs have a long history and some of them were founded in the 50s. Their importance and number increased with the parallel increase in High Seas's fisheries causing large awareness that international cooperation was necessary. More than thirty regional bodies or arrangements (RFBs) have been established during the last century, including fourteen since the adoption of the United

Convention of the Law of the Sea in 1982. They have been constituted as either an advisory or a regulatory body. Two major types RFMOs can be distinguished:

- Tuna and migrating species related RFMOs which members are more distant-water States.
- Non-tuna organizations which are spatially defined and by that focus primarily on coastal states as members.

The EU is member of 5 tuna and 8 non-tuna Organizations.

IV.2.1 The role of RFMOs

Typical measures of RFMOs are:

- Fisheries limits like defined quantitative fishing quota of single species for vessels or in certain locations.
- Technical measures like standards on gear technology, respective marking and labeling of fish and technical control of vessels and equipment.
- Control and monitoring for different dimensions (basic data, vessel monitoring systems, measures against IUU fisheries…)
- Decision making and disputes. Some RFMOs have established their own dispute settlement procedures to solve conflicts between members.
- Relation with non-contracting Parties.

IV.2.2 RFMOs in the Arctic

A large part of the marine area in the Arctic is not covered by a RFMO or arrangement with competence over target species other than tuna and tuna-like species and anadromous species. Only two regionally specified RFMOs have a mandate in the Arctic area:

- The North-East Atlantic Fisheries Commission (NEAFC)
- The Northwest Atlantic Fisheries Organization (NAFO)

IV.2.3 UN mandate given to RFMOs

The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995 UN Fish Stocks Agreement) was adopted on 4 August 1995. The Agreement entered into force on 11 December 2001.

The purpose of the 1995 UN Fish Stocks Agreement is to facilitate the implementation of certain provisions of the 1982 United Nations Convention on the Law of the Sea (1982 Convention) concerning the conservation and management of straddling fish stocks and highly migratory fish stocks. The Agreement complements the 1993 FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (1993 FAO Compliance Agreement) and the 1995 FAO Code of Conduct for Responsible Fisheries.

"The 1995 UN Fish Stocks Agreement places RFMOs in a pivotal and central position in terms of its implementation; they provide the primary mechanism through which States should cooperate to achieve enhanced resources conservation and management. Despite some RFMOs whose mandates extend to the conservation and management of straddling fish stocks and highly migratory fish stocks, RFMOs are grappling with practical aspects of the Agreement's implementation such as how to apply the precautionary approach in fisheries management, how to implement ecosystem management, and how to address transparency"[15].

[15] http://www.fao.org/fishery/topic/13701/en

IV.3. Structure of the NEAFC

IV.3.1 Origins of the Convention

The origins of the Convention on Future Multilateral Co-operation in the North-East Atlantic Fisheries lie in an organisation known as the Permanent Commission, which was founded in 1953. The Permanent Commission was formed under the 1946 Convention for the Regulation of Meshes of Fishing Nets and the Size Limits of Fish. By the early 1960s it was considered that the Commission needed a wider range of powers to regulate the effects of technological advances in fishing methods. In 1963 NEAFC was formed to succeed the Permanent Commission. In addition to the powers of the Permanent Commission, NEAFC was empowered to establish closed fishing areas and seasons, and regulate catch and fishing effort.

Declaration
on the Interpretation and Implementation of the Convention on the Future Multilateral Cooperation in North-East Atlantic Fisheries

"Following the withdrawal from NEAFC of the individual Member States of the European Economic Community (EEC) and the general extension of fisheries limits to 200 nautical miles, negotiations between present and former members of NEAFC resulted in the 1980 Agreement on the Convention on Future Multilateral Co-operation in the North-East Atlantic Fisheries. This new Convention, which entered into force in 1982, differed from the previous Convention in that it provided, inter alia, for the EEC to be a signatory as one entity and to become a Contracting Party. A new Commission, known as NEAFC, was established in November 1982"[16].

IV.3.2 Objective of Agreement

The NEAFC's principal objective is to "promote the conservation and optimum utilisation of the fishery resources of the North-East Atlantic area within a framework appropriate to the regime of extended coastal state jurisdiction over fisheries, and accordingly to encourage international cooperation and consultation with respect to these resources". It is also to promote the exchange of scientific information and data on the state of the fishery resources in the area and on management policies.

The purpose of the Convention is described in Article 4 which provides for the following:

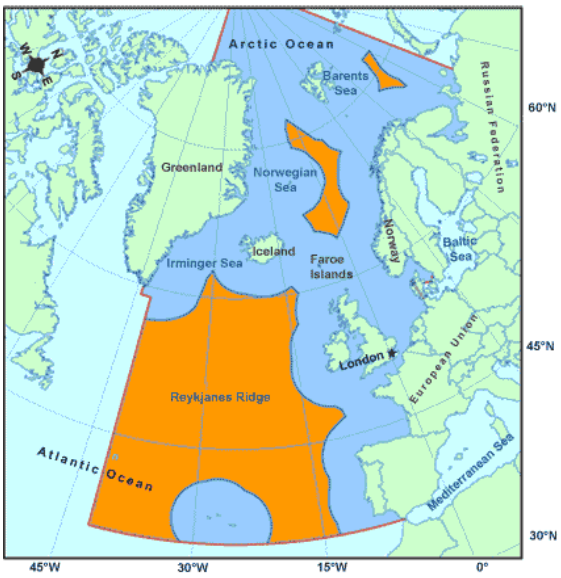
1. The Commission shall perform its functions in the interests of the conservation and optimum utilisation of the fishery resources of the Convention Area and shall take into account the best scientific evidence available to it.
2. The Commission shall provide a forum for consultation and exchange of information on the state of fishery resources in the Convention Area and on management policies, including the examination of the overall effect of such policies on fishery resources.

[16] http://archive.neafc.org/about/docs/london-declaration.pdf

IV.3.3 Duration of Agreement

Indefinite

IV.3.4 The Convention area



The Convention Area covers the Atlantic and Arctic Ocean east of a line south of Cape Farewell – the southern tip of Greenland (42° W), north of a line to the west of Cape Hatteras - the southern tip of Spain (36° N), and west of a line touching the western tip of Novya Semlya (51° E). The Baltic and Mediterranean Seas are excluded.

Most of this area is under the fisheries jurisdiction of NEAFC's Contracting Parties, but three large areas (Orange colour) within this area are international waters and constitute the NEAFC Regulatory Area.

The shaded area to the north east of northern Norway and the Russian Federation is in the Barents Sea, the central area north of the Faroe Islands is the Norwegian Sea, and the third area to the south west of Greenland and Iceland, and west of Faroese and European Union waters comprises the Irminger Sea, Hatton Bank Ridge, Rockall Ridge, the Mid Atlantic Ridge, and the waters north of the Azores.

IV.3.5 Fisheries in the Convention Area

The main fisheries in the Convention Area are for Norwegian Spring Spawning (Atlanto–Scandian) herring, mackerel, blue whiting and oceanic pelagic redfish. These fisheries are all regulated, at least in part, by NEAFC[17].

Demersal fisheries in the Barents Sea area of the Regulatory Area are, however, not regulated by NEAFC but by a fisheries arrangement between the two Coastal States, Norway and the Russian Federation; the Joint Norwegian–Russian Fisheries Commission.

IV.3.6 Membership

The number of Contracting Parties who have ratified the Convention and who make up its membership has changed since 1982, as follows:

The 1982 Convention was signed by thirteen members; Bulgaria, Denmark (in respect of the Faroe Islands), EEC (now EU), Finland, the German Democratic Republic, Iceland, Norway, Portugal, Spain, Sweden and the Soviet Union (now the Russian Federation), and a new Commission was established in 1982.

- *Greenland withdrew from the EEC in February 1985 and has since been represented by Denmark.*
- *From 1990, the interests of the former German Democratic Republic are covered by the EU.*
- *Bulgaria formally discontinued its membership of the Commission in January 1995*
- *Sweden and Finland acceded to the European Union in January 1995 and at the same time discontinued their membership of the Commission*
- *Estonia became a member of the Commission in July 2003*
- *Poland and Estonia acceded to the European Union in 2005 and discontinued their membership of the Commission in 2006*

The present membership is therefore made up as follows:

- *The European Union*
- *Denmark (in respect of the Faroe Islands and Greenland)*
- *Iceland*
- *Norway*
- *The Russian Federation*

IV.3.7 Responsabilities of the Commission

The Convention empowers NEAFC to adopt fisheries management recommendations by qualified majority vote (subject to the objection procedure and dispute resolution procedures). Recommendations become binding on Contracting Parties once objection periods expire. Article 15 of the Convention requires the Parties to effect these recommendations.

The Commission has established a number of Committees and Working Groups to assist it in carrying out its responsibilities pursuant to Article 3, paragraph 8 of the Convention[18].

[17] http://qsr2010.ospar.org/media/assessments/p00465_supplements/p00465_suppl_3_North_East_Atlantic_Fisheries_Commission.pdf

[18] http://archive.neafc.org/news/docs/performance-review-final-edited.pdf

IV.3.8 NEAFC Working Groups

Among other NEAFC working groups, one is of particular interest for "D5.12", the WG on the Future of NEAFC. It has worked on the following issues:

- *Evaluating the role of NEAFC in taking a broader ecosystem approach to fisheries management. In that regard, the WG on the Future of NEAFC shall examine how to strengthen the role of NEAFC in addressing overall ocean management in the Convention Area. The WG shall look into the possible restriction in this respect in the Convention and the consequent need for interpretation and/or amendment.*
- *Examining the role of other regional and global organisations involved in ocean issues in the Convention Area. In this respect, possible gaps or overlaps in work, should be given due attention. Areas of cooperation shall be identified in order to promote responsible and coordinated ocean management in the Convention area.*[19]

IV.3.9 The Secretariat

Article 3 paragraphs 5 and 7 of the Convention establish the office of the Commission in London and stipulate that the Commission shall appoint a Secretary and necessary staff. From 1982 to 1999 Secretarial functions were covered by the UK Ministry of Agriculture, Fisheries and Food (MAFF – now the Department of the Environment Fisheries and Rural Affairs) on a temporary basis.

In 1998 NEAFC's Contracting Parties agreed to strengthen the organisation by establishing an independent Secretariat in London. A permanent Secretariat was established in 1999 creating the post of Secretary (3 year terms), and two permanent full-time posts, one as IT Manager and Vessel Monitoring System (VMS) Administrator and one as Office Manager. Due to the increasing demands for web-based solutions in 2004 staffing was increased with the addition of an IT Assistant.

Staff members are international civil servants working according to rules set up by the NEAFC Commission which are based on regulations established between the UN and the International Civil Service Commission.

The budget for running the Secretariat is part of the budget drawn up by the President of NEAFC and sent to the Contracting Parties. It is reviewed by the Finance and Administration Committee which drafts final proposals to the NEAFC Commissions for decision at the Annual Meeting. The approved total budget for 2006 is just under £760,000 and has increased from approximately £580,000 in 1999 when the permanent Secretariat was first established. Staff costs and allowances amount to about 30% of the total budget.[20]

IV.3.10 International legal personality

International organization established by the Treaty

IV.3.11 Amendment to the Agreement

The Contracting Parties to the Convention adopted an amendment to the Convention at the 23rd Annual Meeting of the North-East Atlantic Fisheries Commission (NEAFC) in November 2004 allowing NEAFC to adopt recommendations establishing procedures for the settlement of disputes arising from the Convention.

[19] http://archive.neafc.org/news/docs/performance-review-final-edited.pdf

[20] http://archive.neafc.org/news/docs/performance-review-final-edited.pdf

By postal vote on 11 August 2006 the Contracting Parties to the Convention adopted an amendment to the Convention whereby the scope of the Convention was extended so as to include sedentary species and the objectives of the Convention were broadened. The Convention was also amended so as to mention developments in other international forums for fisheries management that affect fisheries in the NEAFC Convention area, and certain new definitions were introduced.[21]

IV.4. Extending the spatial scope of the Convention

The NEAFC enlargement option is relevant on the condition newly accessible marine areas fall under the category of "High Seas" (UNCLOS, Part VII). If not, other institutional scenarios are to be considered.

IV.4.1 Rules governing the treaty amendment

The NEAFC Convention doesn't explicitly mention the option of amending its spatial scope but such amendment is not excluded[xxv].

According to Article 19(2) of the NEAFC Convention the adoption of an amendment to the Convention requires a three-fourths majority of all Contracting Parties. In accordance with Article 19(3) of the Convention, an amendment will take effect 120 days following the date of notification by the Depositary of receipt of written notification of approval by three-fourths of all Contracting Parties.

The Vienna Convention on the Law of Treaties (1969) stipulates general rules concerning amendment and modifications of Treaties (Part IV.).

IV.4.2. Initiative-takers

In principle, different groups of countries may initiate such an initiative: either only the current small group of five members would agree on such an extension or other actors like cooperating non-contracting Parties to NEAFC such as Canada, New Zealand, St Kitts and Nevis, or others like USA or even long-distance fishing actors like China.

IV.4.3 The redefinition of the area convention

No case is known from the past of changing area RFMOs. Therefore there is no precedent available.

The redefinition working process of a RFMO's area should not be different from the original definition working process which lead to the present RFOM convention. Along with a legal study (UNCLOS, relevant regimes for Arctic fisheries…), it will very useful to study the negotiations process which historically lead to the RFMO convention.

IV.4.4. Others scenarios

Different options for strengthening Arctic Ocean governance exist, some being a "Soft law" approach, others partening to a "Hard law" approach.

[21] http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=8283

"Soft law" possibilities are, among others:

- Harmonization of environmental and technical standarts by coastal states;
- Development of integrated planning for transboundary marine ecosystems;
- Restructuring the Arctic Council, including by broadening participation.

"Hard law" options are:

- Enlargment of another existing RFMO;
- Extending the special scope of the OSPAR Convention;
- Implementing Agreement under the UNCLOS.
- Establishing a new Arctic RFMO;

Concluding Remarks

V.1. NEARFC enlargment

If small modifications of the NEAFC special scope based on a Large Marine Ecosystem as defined by PAME could be easily accepted by member States and coastal States, (integration of the complete Barents Sea LME No. 20 and Kara Sea No. 58), a large expansions, by which the NEAFC Convention Area would comprise the entire Arctic Ocean, as suggested in the EU Commission's Arctic Communication, appear much more problematic[31].

This is not so much caused by the interests of the new coastal states, namely Canada and the United States. In fact, Canada would not really be a new coastal state as it currently already has the status of Cooperating Non-Contracting Party (NCP) with NEAFC. In light of this status, Canada may even apply for full membership in the future. It is less clear if the United States would have significant problems with the substance of the amended NEAFC Convention.

Perhaps more important, however, is whether or not Canada and the United States have fundamental objections to NEAFC's practices on the establishment and allocation of the total allowable catch (TAC) for straddling fish stocks, for the reason that these clearly give preferential treatment to coastal states. The initiative lies here with the coastal states, who first agree on a coastal state TAC while taking account of the scientific advice provided by ICES. However, as the ICES advice relates to the entire stock, the coastal states effectively determine the high seas TAC as well. The coastal states also allocate the coastal state TAC between them, without specifying which part of each coastal state's allocation should be caught within or beyond areas under national jurisdiction. NEAFC is then charged with determining and allocating the high seas TAC.

While Canada and the United States would, as coastal states, of course benefit from such preferential treatment as well, it is not excluded that they would object to such practices in order to be consistent with their user or non-user interests in other RFMOs and Arrangements.

Much more problematic, however, are the user interests of states that are not coastal states with respect to the North-East Atlantic Ocean or the Arctic Ocean: e.g., the other states that currently have the status of NCP with NEAFC (Belize, Cook Islands, Japan and New Zealand) and other states with large distant water fishing fleets, such as China and South Korea. Even though fishing opportunities in the high seas pocket of the central Arctic Ocean are likely to be very minimal in the near future, climate change may alter the Arctic marine area, both rapidly and fundamentally, in the

medium term. Consequently, it cannot be ruled out that fishing opportunities in the high seas of the Arctic Ocean will be substantial in the medium and long terms[22].

V.3. Implementing Agreement under the UNCLOS

Even though the LOS Convention contains various amendment procedures, two earlier instances the United Nations General Assembly (UNGA) expressed the international community's preference for an Implementing Agreement instead. Thus, while there is no precedent for an Implementing Agreement with a regional scope, no rule of international law, including the UNCLOS, would in principle prevent the international community from pursuing such an option if the required majority so desires[31].

This notwithstanding, there are various reasons why an Implementing Agreement under the UNCLOS is not a realistic option.

Most importantly, the direct link with the UNCLOS would imply that its negotiation process would fall under the UNGA. As the UNCLOS is a global instrument and the UNGA a global body, it would be difficult to conceive of a negotiation process open to a select group of states instead of all members of the United Nations (UN).

However, it is almost unthinkable that the five Arctic Ocean coastal states would support and participate in a negotiation process where they could potentially be confronted by 180-odd states with opposing views and interests.

Such lack of support by the Arctic Ocean coastal states would be obvious if the envisaged Implementing Agreement would apply to the entire Arctic Ocean, including areas under their national jurisdiction. However, even if the instrument would exclusively apply to areas beyond national jurisdiction (high seas and the Area), it is easy to understand that the Arctic Ocean coastal states would fear that the UNGA would not take adequate account of their sovereignty, sovereign rights, and jurisdiction as coastal states when determining substantive and procedural aspects of the negotiation process.

In light of these considerations, it is not surprising that there is no precedent for an Implementing Agreement to the UNCLOS with a regional scope[23].

[22] http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2081919

[23] http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2081919

V.4. Establishing a new Arctic RFMO

Emphasizing the many benefits that one or more binding agreements might offer, various authors and organizations have advocated for the negotiation of a hard law regime for the Arctic[31]. Suggested benefits include:

- Encouraging greater political and bureaucratic commitments;
- Establishing firmer institutional and financial foundations;
- Transcending the vagaries of changing governmental viewpoints and shifting personnel;
- Giving 'legal teeth' to environmental principles and standards;
- Raising the public profile of regional challenges and cooperation needs
- Providing for dispute resolution mechanisms.

However, various reasons have been put forward against - or at least questioning - a treaty-based approach. Reasons given include the following considerations:

- *Difficulty in getting consensus on the need for an agreement;*
- *Lengthy and costly preparatory and negotiation processes involved;*
- *Risk of legalizing lowest common denominator standards;*
- *Stifling political and bureaucratic flexibilities;*
- *Contributing another layer of complexity to the already fragmented array of multilateral environmental agreements.*

The lack of implementation of existing agreements relevant to the Arctic and lack of assurance that all Arctic states will readily accept newly negotiated obligations are additional reasons[24].

V.5. Conclusion

Considering the timeline of Climate change, a rapid and accelerating process providing access to the central Arctic Ocean during summer in a few decades, and of international negociations, the two solutions of special scope enlargement of existing conventions, eg. NEARFC and OSPAR Convention, seems to be the most accurates.

If the amendment of the geographic range of the existing RFMO (NEAFC) can be viewed as more acurated regarding the goal of providing a regulating governance to fishing activities in the central Arctic Ocean to protect Arctic marine ecosystem of overfishing risks, it is important to note that Environment protection is quite different of the common goal of RFMOs: "conservation and management of target species". The US position about such an extension, even if its fishing activity in the Arctic Ocean is very low and performed by Indeginous People (Inuit) for subsistence, is unknown and could reversly affect such an extension.

[24] Page 416. T. Koivurova, L. Brännlund, N. Bankes (Eds.) 2009. Climate Governance in the Arctic. Series: Environment & Policy, Vol. 50 Springer. Pp452

[i] Communication from the Commission to the European Parliament and the Council, The European Union and the Arctic Region, Brussels, 20 November 2008. *eeas.europa.eu/arctic_region/docs/com_08_763_en.pdf*

[ii] Sherman K. and Hempel G. (Editors), 2009. *The UNEP Large Marine Ecosystems Report. A Perspective on Changing Conditions in LMEs of the World's Regional Seas.* UNEP Regional Seas Reports and Studies n° 182.

[iii] Hein Rune Skjoldal and Phil Mundy, 2013. *Large Marine Ecosystems (LMEs) of the Arctic area. Revision of the Arctic LME map.* PAME-led EA EG; 27 February 2013

[iv] *FAO website*: http://www.fao.org/fishery/area/search/en

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[xviii] *Synergies between climate and management for Atlantic cod fisheries at high latitudes*. Olav Sigurd Kjesbu, Bjarte Bogstad, Jennifer A. Devine, Harald Gjøsæter, Daniel Howell, Randi B. Ingvaldsen, Richard D. M. Nash, and Jon Egil Skjæraasen, 2014. PNAS, Vol. 111-9, 3478–3483

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CLASS	ORDER	Family	Comon name	TAXA	TARGETED	ECOZONE	AO	AA	HB	Bb	WG	EG	Brts	Ka	La	ES	Bf	Ch	WB	EB
Actinopterygii	Gadiformes	**Gadidae (cods)**	Arctic cod / East Siberian cod	*Arctogadus glacialis*		A	1	1	1	1	1	1	1	1	1	1	1	1		
			Polar cod	*Boreogadus saida*	1	A	1	1	1	1	1	1	1	1	1		1	1		1
			Navaga	*Eleginus nawaga*	1	A		1												
			Greenland cod	*Gadus ogac*		A		1	1	1	1	1	1				1			
	Perciformes	**Zoarcidae (eelpouts)**		*Gymnelus andersoni*		A	1						1	1	1					
				Gymnelus esipovi		A	1													
			Aurora unernak	*Gymnelus retrodorsalis*		A	1	1	1	1	1	1	1	1	1	1	1	1		
			Fish doctor	*Gymnelus viridis*		A		1	1	1	1	1					1	1		1
			Checkered wolf eel	*Lycenchelys kolthoffi*		A		1	1	1	1	1	1	1	1		1			
			Moray wolf eel	*Lycenchelys muraena*		A		1	1	1	1	1	1	1						
				Lycenchelys platyrhina		A	1													
			Adolf's eelpout	*Lycodes adolfi*		A				1	1	1						1		
			Doubleline eelpout	*Lycodes eudipleurostictus*		A		1	1	1	1	1	1	1	1		1	1		
			Glacial eelpout	*Lycodes frigidus*		A	1	1	1			1	1	1	1	1	1	1		
			Shulupaoluk	*Lycodes jugoricus*		A		1	1			1	1	1	1	1			1	1
			Lütken's eelpout	*Lycodes luetkenii*		A		1		1	1	1	1							
			White sea eelpout	*Lycodes marisalbi*		A														
			McAllister's eelpout	*Lycodes mcallisteri*		A		1		1										
			Saddled eelpout	*Lycodes mucosus*		A	1	1	1	1	1			1	1	1	1	1	1	1
			Paamiut eelpout	*Lycodes paamiuti*		A			1	1	1	1	1							
			Canadian eelpout	*Lycodes polaris*		A	1	1	1	1	1	1	1		1	1	1	1	1	1
			Arctic eelpout	*Lycodes reticulatus*		A			1	1	1	1								
			Threespot eelpout	*Lycodes rossi*		A	1	1	1	1	1	1	1	1	1	1	1	1		
			Archer eelpout	*Lycodes sagittarius*		A		1	1	1								1		
			Longear eelpout	*Lycodes seminudus*		A	1	1	1	1	1	1	1	1	1		1	1		
			Scalebelly eelpout	*Lycodes squamiventer*		A		1	1	1	1	1	1	1			1			
			Polar eelpout	*Lycodes turneri*		A		1	1	1	1			1	1	1	1	1	1	1
				Lycodonus flagellicauda		A						1	1							
	Pleuronectiformes	**Pleuronectidae (righteye flounders)**	Arctic flounder	*Liopsetta glacialis*	1	A	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Salmoniformes	**Salmonidae (Salmons)**	Dolly varden	*Salvelinus malma malma*		A		1	1					1			1	1	1	1
			Arctic cisco	*Coregonus autumnalis*	1	A		1					1	1	1	1	1	1	1	1
			Lake whitefish	*Coregonus clupeaformis*		A		1	1	1	1	1		1		1	1	1		
			Bering cisco	*Coregonus laurettae*		A													1	1
			Muksun	*Coregonus muksun*		A	1													
			Broad whitefish	*Coregonus nasus*	1	A		1					1	1		1	1	1		
			Sardine cisco	*Coregonus sardinella*	1	A		1	1	1		1	1	1	1	1	1	1	1	1
	Scorpaeniformes	**Cottidae (sculpins)**	Hamecon	*Artediellus scaber*		A	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			Arctic hookear sculpin	*Artediellus uncinatus*		A		1	1	1	1	1	1	1			1	1		

Northern temperate seas 815

Arctic fishes 8,2%

Arctico-boreal fishes 4,7%

Boreal fisches 67,6%

Both Hemispheres fishche 19,5%

Iceland

White Sea

			Arctic staghorn sculpin	*Gymnocanthus tricuspis*		A		1	1	1	1	1	1	1	1	1	1	1	1	1	
			Twohorn sculpin	*Icelus bicornis*		A	1	1	1	1	1	1	1	1	1	1	1	1			
			Fourhorn sculpin	*Myoxocephalus quadricornis*		A	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
			Arctic sculpin	*Myoxocephalus scorpioides*		A	1	1	1	1	1	1	1	1	1	1	1	1			1
			Chukot fringed sculpin	*Porocottus quadrifilis*		A													1		
			Bigeye sculpin	*Triglops nybelini*		A			1	1	1	1	1								
		Agonidae (poachers)	Arctic alligatorfish	*Aspidophoroides olrikii* / Ulcina olrikii		A	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		Psychrolutidae (fathead sculpins)	Sadko sculpin	*Cottunculus sadko*		A				1	1	1	1	1							
				Psychrolutes subspinosus		A						1									
		Cyclopteridae (lumpfishes)	Smooth lumpfish	*Cyclopteropsis jordani*		A		1						1							
			Arctic lumpsucker	*Cyclopteropsis mcalpini*		A				1			1								
			Leatherfin lumpsucker	*Eumicrotremus derjugini*		A	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
			Atlantic spiny lumpsucker	*Eumicrotremus spinosus*		A		1	1	1	1	1	1	1			1	1			
		Liparidae (snailfishes)	Deryugin's tadpole	*Careproctus derjugini*		A	1						1								
				Careproctus dubius		A	1						1								
			Kido's snailfish	*Careproctus kidoi*		A				1	1										
			Knipowitsch's tadpole	*Careproctus knipowitschi*		A							1								
			Large-eyed tadpole	*Careproctus macrophthalmus*		A							1								
			"arctic snailfish"	*Careproctus micropus*		A															1
			Scotian snailfish	*Careproctus ranula*		A				1	1										
			Sea tadpole	*Careproctus reinhardti*		A				1	1		1	1				1	1	1	
				Careproctus solidus		A									1						
			Tapir tadpole	*Careproctus tapirus*		A							1								
			Telescope tadpole	*Careproctus telescopus*		A							1								
			Gelatinous snailfish	*Liparis fabricii*		A	1	1	1	1	1	1	1	1	1		1	1	1	1	
			Variegated snailfish	*Liparis gibbus*		A		1	1	1	1	1	1	1	1		1	1	1	1	
			Kelp snailfish	*Liparis tunicatus*		A	1	1	1	1	1	1	1	1	1	1	1	1			
			Black seasnail	*Paraliparis bathybius*		A		1	1	1	1	1	1	1							
				Paraliparis violaceus		A	1														
			Threadfin seasnail	*Rhodichthys regina*		A				1	1	1	1								
Chondrichthyes	Rajiformes	**Rajidae (skates)**	Arctic skate	*Amblyraja hyperborea*		A	1	1	1	1	1	1	1	1	1				1	1	67 espèces
Actinopterygii	Clupeiformes	**Clupeidae (herrings)**	Pacific herring	Clupea pallasii	1	AB							1					1		1	
Actinopterygii	Gadiformes	**Phycidae (phycid hakes)**	Arctic rockling	*Gaidropsarus argentatus*		AB						1	1								
			Threadfin rockling	*Gaidropsarus ensis*		AB			1	1	1	1									
		Gadidae (cods)	Saffron cod	*Eleginus gracilis*	1	AB											1	1	1	1	
			Pacific cod	*Gadus macrocephalus*	1	AB												1	1	1	
	Gasterosteiformes	**Gasterosteidae (Stickleback)**	Ninespines stickleback	*Pungitius pungitius*		AB		1	1	1	1		1	1			1	1	1	1	
	Myctophiformes	**Myctophidae (lanternfishes)**	Glacier lantern fish	*Benthosema glaciale*		AB				1	1	1	1								
			Madeira lantern fish	*Ceratoscopelus maderensis*		AB						1	1								
			Jewel lanternfish	*Lampanyctus crocodilus*		AB					1	1	1								
			Arctic telescope	*Protomyctophum arcticum*		AB				1	1	1									
	Osmeriformes	**Osmeridae (smelts)**	Capelin	*Mallotus villosus*	1	AB			1	1	1	1	1	1				1	1	1	

			Rainbow smelt	*Osmerus mordax*		AB	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
			European smelt	*Osmerus eperlanus*		B																
			Eulachon	*Thaleichthys pacificus*		B																
	Perciformes	**Zoarcidae (eelpouts)**	Halfbarred pout	*Gymnelus hemifasciatus*		AB	1	1	1	1		1	1	1	1	1	1	1	1	1		
			Pale eelpout	*Lycodes pallidus*		AB	1	1	1	1	1	1	1	1	1		1	1				
		Stichaeidae (pricklebacks)	Stout eelblenny	*Anisarchus medius*		AB		1	1	1	1	1	1	1	1	1	1	1	1	1		
			Fourline snakeblenny	*Eumesogrammus praecisus*		AB			1	1	1	1		1	1	1	1	1	1	1		
			Daubed shanny	*Leptoclinus maculatus*		AB		1	1	1	1	1	1	1				1	1	1		
			Slender eelblenny	*Lumpenus fabricii*		AB		1	1	1	1	1	1	1	1	1	1	1	1	1		
			Arctic shanny	*Stichaeus punctatus*		AB		1	1	1	1			1				1	1	1		
		Pholidae (gunnels)	Banded gunnel	*Pholis fasciata*		AB		1	1	1	1	1		1				1	1	1		
		Anarhichadidae (wolffishes)	Northern wolffish	*Anarhichas denticulatus*	1	AB			1	1	1	1	1	1								
		Amnodytidae (sand lances)	Northern sand lance	*Ammodytes dubius*		AB		1		1	1	1										
			Pacific sand lance	*Ammodytes hexapterus*		AB														1	1	
	Pleuronectiformes	**Pleuronectidae (righteye flounders)**	Bering flounder	*Hippoglossoides robustus*		AB		1	1					1				1	1	1		
			Starry flounder	*Platichthys stellatus*		AB		1										1	1	1		
			Greenland halibut	*Reinhardtius hippoglossoides*	1	AB	1	1	1		1	1	1	1			1	1	1	1		
	Salmoniformes	**Salmonidae (Salmons)**	Pink salmon	*Oncorhynchus gorbuscha*		AB											1	1	1	1		
	Scorpaeniformes	**Cottidae (sculpins)**	Atlantic hookear sculpin	*Artediellus atlanticus*		AB			1	1	1	1	1					1				
			Spatulate sculpin	*Icelus spatula*		AB	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
			Shorthorn sculpin / Warty sculpi	*Myoxocephalus scorpius* / *Myoxocephalus verrucosus*		AB	1	1	1	1		1	1	1	1	1	1	1	1	1		
			Steller's sculpin	*Myoxocephalus stelleri*		AB		1	1					1			1	1	1	1		
			Ribbed sculpin	*Triglops pingelii*		AB		1	1	1	1	1	1	1	1	1	1	1	1	1		
		Agonidae (poachers)	Atlantic poacher	*Leptagonus decagonus*		AB		1	1	1	1	1	1									
				Podothecus veternus		AB														1	1	
		Psychrolutidae (fathead sculpins)	Polar sculpin	*Cottunculus microps*		AB			1	1	1	1	1					1				
		Liparidae (snailfishes)	Longfin snailfish	*Careproctus longipinnis*		AB				1	1	1	1									
				Liparis marmoratus		AB														1		
Chondrichthyes	Squaliformes	**Somniosidae (sleeper sharks)**	Greenland shark	*Somniosus microcephalus*		AB			1	1	1	1	1	1								38 espèces
Actinopterygii	Anguilliformes	**Anguillidae (freshwater eels)**	European eel	*Anguilla anguilla*		B				1		1	1									
			American eel	*Anguilla rostrata*		B					1	1										
		Ophichthidae (Snake eels)	String eel	*Gordiichthys leibyi*		B					1	1										
		Congridae (conger eels)	European conger	*Conger conger*		B						1										
	Argentiniformes	**Argentinidae (argentines or smelts)**	Greater argentine	*Argentina silus*	1	B				1	1	1	1									
			Argentine	*Argentina sphyraena*		B																Iceland - Norwegian Sea
		Opisthoproctidae(barreleyes)	Winged spookfish	*Dolichopteryx parini*		B														1	1	
			Barreleye	*Macropinna microstoma*		B														1	1	
		Microstomatidae (pencilsmelts)	Goiter blacksmelt	*Bathylagus euryops*		B				1	1	1	1									
			Slender blacksmelt	*Bathylagus pacificus*		B															1	
			Northern smoothtongue	*Leuroglossus schmidti*		B														1	1	
			Eared blacksmelt	*Lipolagus ochotensis*		B														1	1	
			Bluethroat argentine	*Nansenia candida*		B															1	

			Greenland argentine	*Nansenia groenlandica*		B				1	1	1									
			Stout blacksmelt	*Pseudobathylagus milleri*		B													1	1	
		Alepocephalidae (slickheads)	Agassiz' slickhead	*Alepocephalus agassizii*		B				1	1	1									
			Baird's slickhead	*Alepocephalus bairdii*		B				1	1	1									
	Atheriniformes	**Atherinopsidae (silversides)**	Atlantic silverside	*Menidia menidia*		B				1											
	Aulopiformes	**Notosudidae (waryfishes)**		*Scopelosaurus adleri*		B													1	1	
			Scaly paperbone	*Scopelosaurus harryi*		B													1	1	
			Blackfin waryfish	*Scopelosaurus lepidus*		B				1	1	1	1								
		Scopelarchidae (pearleyes)	Northern pearleye	*Benthalbella dentata*		B													1	1	
			Longfin pearleye	*Benthalbella linguidens*		B														1	
		Paralepididae (barracudinas)	North Pacific daggertooth	*Anotopterus nikparini*		B				1	1	1							1	1	
			Daggertooth	*Anotopterus pharao*		B				1	1	1									
			Slender barracudina	*Lestidiops ringens*		B														1	
	Beloniformes	**Belonidae (needlefishes)**	Garfish	*Belone belone*		B															Iceland - Norwegian Sea
		ScomberesocidaeE (sauries)	Pacific saury	*Cololabis saira*	1	B														1	
	Clupeiformes	**Clupeidae (herrings)**	Atlantic herring	*Clupea harengus*	1	B				1	1	1	1								
			European pilchard	*Sardina pilchardus*		B															Iceland
			European sprat	*Sprattus sprattus*		B															Norwegian Sea
	Gadiformes	**Macrouridae (grenadiers)**	Giant grenadier	*Albatrossia pectoralis*		B													1	1	
			Hollowsnout grenadier	*Coelorinchus caelorhincus*		B					1	1									
			Spearsnouted grenadier	*Coelorinchus labiatus*		B															Iceland
			Pacific grenadier	*Coryphaenoides acrolepis*	1	B													1	1	
				Coryphaenoides brevibarbis		B				1	1	1									
			Popeye grenadier	*Coryphaenoides cinereus*		B													1	1	
			Filamented rattail	*Coryphaenoides filifer*		B													1	1	
			Ghostly grenadier	*Coryphaenoides leptolepis*		B														1	
			Longfin grenadier	*Coryphaenoides longifilis*		B													1	1	
			Roundnose grenadier	*Coryphaenoides rupestris*	1	B				1	1	1	1								
			Roughhead grenadier	*Macrourus berglax*	1	B			1	1	1	1	1								
			Common Atlantic grenadier	*Nezumia aequalis*		B						1	1								
			Marlin-spike grenadier	*Nezumia bairdii*		B				1											
			Roughnose grenadier	*Trachyrincus murrayi*		B				1	1	1									
		Moridae (depsea cod)	Finescale mora	*Antimora microlepis*		B													1	1	
			Longfin codling	*Laemonema longipes*		B													1	1	
			North Atlantic codling	*Lepidion eques*		B				1	1	1									
		Merluciidae (merluccid hakes)	European hake	*Merluccius merluccius*		B							1								
		Phycidae (phycid hakes)	Fivebeard rockling	*Ciliata mustela*		B							1								
			Northern rockling	*Ciliata septentrionalis*		B							1								
			Fourbeard rockling	*Enchelyopus cimbrius*		B				1	1	1	1								
			Shore rockling	*Gaidropsarus mediterraneus*		B															North Sea
			Greater forkbeard	*Phycis blennoides*		B							1								
			Longfin hake	*Phycis chesteri*		B				1	1	1									
			Tusk / Cusk	*Brosme brosme*	1	B				1	1	1	1								

			Silvery pout	*Gadiculus argenteus*		B														Iceland - Norwegian Sea
			Alaska pollock	*Gadus chalcogrammus (Theragra chalcogramma)*	1	B													1	1	
			Atlantic Cod	*Gadus morhua*	1	B		1	1	1	1	1	1								
			Haddock	*Melanogrammus aeglefinus*	1	B				1	1	1	1								
			Whiting	*Merlangius merlangus*	1	B							1								
			Pacific tomcod	*Microgadus proximus*		B														1	
			Blue whiting	*Micromesistius poutassou*	1	B				1	1	1	1								
			Blue ling	*Molva dypterygia*		B				1	1	1	1								
			Ling	*Molva molva*	1	B						1	1								
			Pollack	*Pollachius pollachius*	1	B							1								
			Saithe	*Pollachius virens*	1	B				1	1	1	1								
			Norway pout	*Trisopterus esmarkii*	1	B						1	1								
			Poor cod	*Trisopterus minutus*		B															Iceland - Norwegian Sea
			White hake	*Urophycis tenuis*		B															Iceland - Labrador Sea
	Gasterosteiformes	**Gasterosteidae (Sticklebacks)**	Three-spined stickleback	*Gasterosteus aculeatus*		B			1	1	1	1	1					1	1	1	
		Syngnathidae (pipefishes)	Snake pipefish	*Entelurus aequoreus*		B															Iceland - Norwegian Sea
			Worm pipefish	*Nerophis lumbriciformis*		B															North Sea
			Straightnose pipefish	*Nerophis ophidion*		B															Norwegian Sea
			Broadnosed pipefish	*Syngnathus typhle*		B							1								
	Lophiiformes	**Lophiidae (goosefishes)**	Angler	*Lophius piscatorius*	1	B						1	1								
		Oneirodidae (dreamers)		*Bertella idiomorpha*		B													1	1	
			Bulb-fish	*Oneirodes bulbosus*		B													1	1	
				Oneirodes macrosteus		B				1	1	1	1								
			Alaska dreamer	*Oneirodes thompsoni*		B													1	1	
		Linophrynidae (Leftvents)	Leftvents	*Linophryne algibarbata*		B				1	1	1	1								
				Linophryne coronata		B				1	1	1	1								
		Thaumatichthyidae (Wolftrap anglers)		*Lasiognathus beebei*		B				1	1	1	1						1	1	
	Mugiliformes	**Mugilidae (mullets)**	Thicklip grey mullet	*Chelon labrosus*		B															Iceland
			Golden grey mullet	*Liza aurata*		B															Iceland - Norwegian Sea
			Thinlip grey mullet	*Liza ramada*		B															North Sea
	Myctophiformes	**Myctophidae (lanternfishes)**		*Diaphus gigas*		B													1	1	
			White-spotted lantern fish	*Diaphus rafinesquii*		B				1		1									
			California headlightfish	*Diaphus theta*		B														1	
				Lampadena yaquinae		B													1	1	
			Spinytail lampfish	*Lampanyctus acanthurus*		B													1	1	
			Brokenline lanternfish	*Lampanyctus jordani*		B													1	1	
			Spotted lanternfish	*Myctophum punctatum*		B				1	1	1	1								
			Pinpoint lampfish	*Nannobrachium regale*		B													1	1	
			Lancet fish	*Notoscopelus kroeyeri*		B				1	1	1									
			Bigeye lanternfish	*Protomyctophum thompsoni*		B													1	1	
			Northern lampfish	*Stenobrachius leucopsarus*		B													1	1	
			Garnet lanternfish	*Stenobrachius nannochir*		B													1	1	
			Bigfin lanternfish	*Symbolophorus californiensis*		B													1	1	

			Large-scale lantern fish	*Symbolophorus veranyi*		B		1		1		1									
			Blue lanternfish	*Tarletonbeania crenularis*		B														1	1
			North Pacific lanternfish	*Tarletonbeania taylori*		B														1	1
	Ophidiiformes	**Ophidiidae (cusk-eels)**		*Bassozetus zenkevitchi*		B														1	1
		Platytroctidae (tubeshoulders)	Koefoed's searsid	*Searsia koefoedi*		B				1	1	1	1							1	1
	Perciformes	**Moronidae (temperate basses)**	European seabass	*Dicentrarchus labrax*		B							1								
		Carangidae (jacks and pompanos)	Atlantic horse mackerel	*Trachurus trachurus*		B															Iceland - Norwegian Sea
			Pacific jack mackerel	*Trachurus symmetricus*		B															1
		Bramidae (pomfrets)	Atlantic fanfish	*Pterycombus brama*		B				1		1									
		Caristiidae (manefishes)	Manefish	*Caristius macropus*		B														1	1
		Nomeidae (Driftfishes)	Driftfish	*Cubiceps gracilis*		B						1	1								
		Sparidae (porgies)	Black seabream	*Spondyliosoma cantharus*		B															North Sea - Norwegian Sea
			Blackspot seabream	*Pagellus bogaraveo*		B															Iceland - Norwegian Sea
			Common pandora	*Pagellus erythrinus*		B															Norwegian Sea
		Labridae (wrasses)	Scale-rayed wrasse	*Acantholabrus palloni*		B															North Sea - Norwegian Sea
			Rock cook	*Centrolabrus exoletus*		B						1	1								
			Goldsinny-wrasse	*Ctenolabrus rupestris*		B															Norwegian Sea
			Ballan wrasse	*Labrus bergylta*		B															Iceland - Norwegian Sea
			Cuckoo wrasse	*Labrus mixtus*		B							1								
			Baillon's wrasse	*Symphodus bailloni*		B							1								
			Corkwing wrasse	*Symphodus melops*		B															Norwegian Sea
		Bathymasteridae (ronquils)	Alaskan ronquil	*Bathymaster caeruleofasciatus*		B															1
			Smallmouth ronquil	*Bathymaster leurolepis*		B														1	1
			Searcher	*Bathymaster signatus*		B		1									1	1	1	1	1
			Northern ronquil	*Ronquilus jordani*		B														1	1
		Zoarcidae (eelpouts)	Twoline eelpout	*Bothrocara brunneum*		B														1	1
				Bothrocara hollandi		B														1	1
				Bothrocarina microcephala		B														1	1
			Soft eelpout	*Bothrocara molle*		B														1	1
			Alaska eelpout	*Bothrocara pusillum*		B															1
				Gymnelopsis ochotensis		B														1	1
				Gymnelus obscurus		B														1	1
			Aleutian pout	*Gymnelus popovi*		B															1
				Lycenchelys alba		B				1	1	1	1								
				Lycenchelys alta		B														1	1
				Lycenchelys camchatica		B														1	1
			Snakehead eelpout	*Lycenchelys crotalinus*		B														1	1
				Lycenchelys hippopotamus		B														1	1
				Lycenchelys melanostomias		B														1	1
				Lycenchelys micropora		B														1	1
			Common wolf eel	*Lycenchelys paxillus*		B				1	1	1									
				Lycenchelys plicifera		B														1	
				Lycenchelys rassi		B															Okhostk Sea

				Lycenchelys ratmanovi		B													1	1	
				Lycenchelys rosea		B													1	1	
			Sar's wolf eel	*Lycenchelys sarsii*		B				1	1	1	1								
				Lycenchelys volki		B													1		
			Deepwater slipskin	*Lycodapus endemoscotus*		B													1	1	
			Blackmouth eelpout	*Lycodapus fierasfer*		B													1	1	
				Lycodapus leptus		B														1	
			Pallid eelpout	*Lycodapus mandibularis*		B														1	
			Stout slipskin	*Lycodapus pachysoma*		B														1	
			Smallhead eelpout	*Lycodapus parviceps*		B														1	
				Lycodapus poecilus		B													1	1	
			Specklemouth eelpout	*Lycodapus psarostomatus*		B														1	
			Bering eelpout	*Lycodes beringi*		B													1	1	
			Shortfin eelpout	*Lycodes brevipes*		B													1	1	
			Tawnystripe eelpout	*Lycodes brunneofasciatus*		B													1	1	
			Ebony eelpout	*Lycodes concolor*		B													1	1	
			Bigfin eelpout	*Lycodes cortezianus*		B														1	
			Black eelpout	*Lycodes diapterus*		B													1	1	
			Greater eelpout	*Lycodes esmarkii*		B				1	1	1	1								
			Banded eelpout	*Lycodes fasciatus*		B															Okhotsk Sea
				Lycodes gracilis		B				1	1	1	1								
			Newfoundland eelpout	*Lycodes lavalaei*		B				1	1										
			Blackbelly eelpout	*Lycodes pacificus*		B														1	
			Wattled eelpout	*Lycodes palearis*		B		1	1				1	1					1	1	1
			Marbled eelpout	*Lycodes raridens*		B		1	1					1			1	1	1	1	
				Lycodes soldatovi		B													1		
				Lycodes tanakae		B													1	1	
			Vahl's eelpout	*Lycodes vahlii*		B		1	1	1	1	1		1							
			Chevron scutepout	*Lycodonus mirabilis*		B				1	1										
			Atlantic soft pout	*Melanostigma atlanticum*		B				1	1	1									
				Nalbantichthys elongatus		B													1	1	
				Opaeophacus acrogeneius		B													1	1	
				Puzanovia rubra		B													1	1	
			Looseskin eelpout	*Taranetzella lyoderma*		B													1	1	
				Zoarces elongatus		B													1	1	
			Eelpout	*Zoarces viviparus*		B							1								
		Stichaeidae (pricklebacks)	Pighead prickleback	*Acantholumpenus mackayi*		B		1	1	1				1	1		1	1	1	1	
			Stone cockscomb	*Alectrias alectrolophus*		B													Stichaeopsis		1
			Lesser prickleback	*Alectridium aurantiacum*		B													1	1	
			Slender cockscomb	*Anoplarchus insignis*		B														1	
			High cockscomb	*Anoplarchus purpurescens*		B														1	
			Nutcracker prickleback	*Bryozoichthys lysimus*		B													1	1	
			Pearly prickleback	*Bryozoichthys marjorius*		B														1	

			Yarrell's blenny	*Chirolophis ascanii*		B					1	1	1							
			Decorated warbonnet	*Chirolophis decoratus*		B														1
			Mosshead warbonnet	*Chirolophis nugator*		B														1
			Bearded warbonnet	*Chirolophis snyderi*		B													1	1
			Six-lined prickleback	*Ernogrammus hexagrammus*		B													1	1
			Trident prickleback	*Gymnoclinus cristulatus*		B													1	
			Longsnout prickleback	*Lumpenella longirostris*		B													1	1
			Snakeblenny	*Lumpenus lampretaeformis*		B				1	1	1	1							
			Snake prickleback	*Lumpenus sagitta*		B													1	1
			Ocellated blenny	*Opisthocentrus ocellatus*		B													1	1
			Ribbon prickleback	*Phytichthys chirus*		B														1
			Whitebarred prickleback	*Poroclinus rothrocki*		B														1
		Cryptacanthodidae (wrymouths)	Dwarf wrymouth	*Cryptacanthodes aleutensis*		B													1	1
			Giant wrymouth	*Cryptacanthodes giganteus*		B														1
		Pholidae (gunnels)	Rock gunnel	*Pholis gunnellus*		B				1	1	1	1							
			Crescent gunnel	*Pholis laeta*		B													1	1
				Pholis picta		B													1	1
			Stippled gunnel	*Rhodymenichthys dolichogaster*		B													1	1
		Anarhichadidae (wolffishes)	Atlantic wolffish	*Anarhichas lupus*	1	B				1	1	1	1							
			Spotted wolffish	*Anarhichas minor*	1	B				1	1	1	1							
			Bering wolffish	*Anarhichas orientalis*		B		1	1									1	1	1
			Wolf-eel	*Anarrhichthys ocellatus*		B												1	1	1
		Ptilichthyidae (quillfishes)	Quillfish	*Ptilichthys goodei*		B													1	1
		Zaproridae (prowfishes)	Prowfish	*Zaprora silenus*		B													1	1
		Scytalinidae (graveldivers)	Graveldiver	*Scytalina cerdale*		B													1	1
		Trichodontidae (sandfishes)	Pacific sandfish	*Trichodon trichodon*		B													1	1
			Sailfin sandfish	*Arctoscopus japonicus*		B														
		Ammodytidae (sand lances)	American sand lance	*Ammodytes americanus*		B					1									
			Lesser sand-eel	*Ammodytes marinus*		B					1	1	1							
			Small sandeel	*Ammodytes tobianus*		B							1							
			Great sandeel	*Hyperoplus lanceolatus*		B														Iceland - Norwegian Sea
		Trachinidae (weeverfishes)	Greater weever	*Trachinus draco*		B														Iceland - Norwegian Sea
		Icosteidae (ragfishes)	Ragfish	*Icosteus aenigmaticus*		B													1	1
		Callionymidae (dragonets)		*Callionymus lyra*		B														Iceland - Norwegian Sea
			dragonet	*Callionymus maculatus*		B														Iceland - Norwegian Sea
		Gobiidae (gobies)	Jeffrey's goby	*Buenia jeffreysii*		B														Iceland - Norwegian Sea
			Crystal goby	*Crystallogobius linearis*		B							1							
			Diminutive goby	*Lebetus scorpioides*		B														Iceland - Norwegian Sea
			Black goby	*Gobius niger*		B														Iceland - Norwegian Sea
			Two-spotted goby	*Gobiusculus flavescens*		B														Iceland - Norwegian Sea
			Norway goby	*Pomatoschistus norvegicus*		B														Iceland
			Common goby	*Pomatoschistus microps*		B														Iceland - Norwegian Sea
			Sand goby	*Pomatoschistus minutus*		B							1							

			Painted goby	*Pomatoschistus pictus*		B														Iceland - Norwegian Sea
		Trichiuridae (cutlassfishes)	Pacific black scabbardfish	*Aphanopus arigato*		B												1	1	
			Black scabbardfish	*Aphanopus carbo*		B						1						1	1	
		Scombridae (mackerels and tunas)	Pacific bonito	*Sarda lineolata*		B													1	
			Atlantic mackerel	*Scomber scombrus*	1	B				1	1	1	1							
		Centrolophidae (medusafishes)	Cornish blackfish	*Schedophilus medusophagus*		B				1	1	1								
	Pleuronectiformes	**Scophthalmidae (turbots)**	Megrim	*Lepidorhombus whiffiagonis*		B														Iceland - Norwegian Sea
			Norwegian topknot	*Phrynorhombus norvegicus*		B						1								
			Turbot	*Psetta maxima*		B														Iceland - Norwegian Sea
			Brill	*Scophthalmus rhombus*		B														Iceland - Norwegian Sea
		Pleuronectidae (righteye flounders)	Scale-eye plaice	*Acanthopsetta nadeshnyi*	1	B												1	1	
			Kamchatka flounder	*Atheresthes evermanni*	1	B												1	1	
			Arrow-tooth flounder	*Atheresthes stomias*	1	B												1	1	
				Cleisthenes herzensteini		B												1	1	
			Roughscale sole	*Clidoderma asperrimum*	1	B												1	1	
			Petrale sole	*Eopsetta jordani*		B												1	1	
			Witch flounder	*Glyptocephalus cynoglossus*		B				1	1	1	1							
			Blackfin flounder	*Glyptocephalus stelleri*	1	B												1	1	
			Rex sole	*Glyptocephalus zachirus*	1	B												1	1	
			Flathead flounder	*Hippoglossoides dubius*		B												1	1	
			Flathead sole	*Hippoglossoides elassodon*	1	B												1	1	
			American plaice	*Hippoglossoides platessoides*	1	B				1	1	1	1							
			Atlantic halibut	*Hippoglossus hippoglossus*	1	B				1	1	1	1							
			Pacific halibut	*Hippoglossus stenolepis*	1	B												1	1	1
			Butter sole	*Isopsetta isolepis*		B													1	1
			Rock sole	*Lepidopsetta bilineata*	1	B													1	1
			Dusky sole	*Lepidopsetta mochigarei*		B													1	1
			Northern rock sole	*Lepidopsetta polyxystra*		B													1	1
			Yellowfin sole	*Limanda aspera*	1	B												1	1	1
			Common dab	*Limanda limanda*		B						1								
			Longhead dab	*Limanda proboscidea*		B		1						1				1	1	1
			Sakhalin sole	*Limanda sakhalinensis*		B													1	1
			Slender sole	*Lyopsetta exilis*		B														1
			Slime flounder	*Microstomus achne*		B													1	1
			Lemon sole	*Microstomus kitt*		B						1								
			Dover sole	*Microstomus pacificus*	1	B													1	1
			English sole	*Parophrys vetulus*	1	B														1
			European flounder	*Platichthys flesus*		B						1								
			European plaice	*Pleuronectes platessa*	1	B					1	1	1							
			Alaska plaice	*Pleuronectes quadrituberculatus*	1	B													1	1
			C-O sole	*Pleuronichthys coenosus*		B														1
			Curlfin sole	*Pleuronichthys decurrens*		B														1
			Pacific sand sole	*Psettichthys melanostictus*		B													1	1

			Comon sole	*Solea solea*		B							1							
	Salomoniformes	**Salmonidae (Salmons)**	European whitefish	*Coregonus lavaretus*		B						1	1							
			Chum salmon	*Oncorhynchus keta*		B													1	1
			Coho salmon	*Oncorhynchus kisutch*		B													1	1
			Rainbow trout	*Oncorhynchus mykiss*		B														1
			Sockeye salmon	*Oncorhynchus nerka*		B													1	1
			Chinook salmon	*Oncorhynchus tshawytscha*		B												1	1	1
			Atlantic salmon	*Salmo salar*		B			1	1	1	1	1							
			Arctic char	*Salvelinus alpinus alpinus*		B		1	1	1	1	1	1	1			1	1		
			Brook trout	*Salvelinus fontinalis*		B					1									
			Sheefish / Inconnu	*Stenodus leucichthys*	1	B												1		
	Scorpaeniformes	**Scorpaenidae (scorpionfishes)**	Rougheye rockfish	*Sebastes aleutianus*	1	B													1	1
			Pacific ocean perch	*Sebastes alutus*	1	B													1	1
			Brown rockfish	*Sebastes auriculatus*		B														1
			Redbanded rockfish	*Sebastes babcocki*		B													1	1
			Shortraker rockfish	*Sebastes borealis*		B													1	1
			Silvergray rockfish	*Sebastes brevispinis*	1	B														1
			Copper rockfish	*Sebastes caurinus*		B														1
			Dusky rockfish	*Sebastes ciliatus*		B														1
			Darkblotched rockfish	*Sebastes crameri*	1	B													1	1
			Splitnose rockfish	*Sebastes diploproa*		B														1
			Greenstriped rockfish	*Sebastes elongatus*		B														1
			Widow rockfish	*Sebastes entomelas*		B														1
			Acadian redfish	*Sebastes fasciatus*		B						1								
			Yellowtail rockfish	*Sebastes flavidus*		B														1
			Gray rockfish	*Sebastes glaucus*		B													1	
			Quillback rockfish	*Sebastes maliger*		B														1
			Ocean perch	*Sebastes marinus*		B				1										
			Black rockfish	*Sebastes melanops*		B													1	1
			Blackspotted rockfish	*Sebastes melanostictus*		B													1	1
			Beaked redfish	*Sebastes mentella*	1	B				1	1	1	1							
			Tiger rockfish	*Sebastes nigrocinctus*		B														1
			Golden redfish	*Sebastes norvegicus*	1	B				1	1	1	1							
				Sebastes owstoni		B													1	1
			Bocaccio rockfish	*Sebastes paucispinis*		B														1
			Canary rockfish	*Sebastes pinniger*		B														1
			Northern rockfish	*Sebastes polyspinis*		B													1	1
			Redstripe rockfish	*Sebastes proriger*	1	B													1	1
			Yellowmouth rockfish	*Sebastes reedi*		B														1
			Yelloweye rockfish	*Sebastes ruberrimus*	1	B														1
			Korean rockfish	*Sebastes schlegelii*		B													1	1
				Sebastes variabilis		B		1									1		1	1
			Harlequin rockfish	*Sebastes variegatus*		B													1	1

			Pygmy rockfish	*Sebastes wilsoni*		B														1	
			Norway redfish	*Sebastes viviparus*		B						1	1								
			Sharpchin rockfish	*Sebastes zacentrus*		B														1	1
			Shortspine thornyhead	*Sebastolobus alascanus*		B														1	1
			Longspine thornyhead	*Sebastolobus altivelis*		B														1	1
			Broadbanded thornyhead	*Sebastolobus macrochir*	1	B															1
		Triglidae (searobins or gurnards)	Grey gurnard	*Eutrigla gurnardus*		B							1								
			Red gurnard	*Chelidonichthys cuculus*		B																Norwegian Sea
			Tub gurnard	*Trigla lucerna*		B																Iceland - Norwegian Sea
		Anoplopomatidae (sablefishes)	Sablefish	*Anoplopoma fimbria*	1	B														1	1	
			Skilfish	*Erilepis zonifer*		B														1	1	
		Hexagrammidae (greenlings)	Kelp greenling	*Hexagrammos decagrammus*		B														1	1	
			Rock greenling	*Hexagrammos lagocephalus*		B														1	1	
			Masked greenling	*Hexagrammos octogrammus*	1	B														1	1	
			Whitespotted greenling	*Hexagrammos stelleri*		B														1	1	
			Lingcod	*Ophiodon elongatus*		B															1	
			Painted greenling	*Oxylebius pictus*		B															1	
			Atka mackerel	*Pleurogrammus monopterygius*	1	B														1	1	
		Cottidae (sculpins)	Scaled sculpin	*Archistes biseriatus*		B															1	
			Plumed sculpin	*Archistes plumarius*		B														1		
			Blackfin hookear sculpin	*Artediellichthys nigripinnis*		B														1	1	
				Artediellus camchaticus		B														1		
				Artediellus dydymovi		B														1	1	
				Artediellus gomojunovi		B														1		
				Artediellus miacanthus		B														1	1	
				Artediellus ochotensis		B														1		
			Hookhorn sculpin	*Artediellus pacificus*		B														1	1	
			Padded sculpin	*Artedius fenestralis*		B															1	
			Scalyhead sculpin	*Artedius harringtoni*		B															1	
			Smoothhead sculpin	*Artedius lateralis*		B														1	1	
			Rosylip sculpin	*Ascelichthys rhodorus*		B															1	
				Bolinia euryptera		B														1	1	
			Sharpnose sculpin	*Clinocottus acuticeps*		B														1	1	
			Calico sculpin	*Clinocottus embryum*		B														1	1	
			Mosshead sculpin	*Clinocottus globiceps*		B															1	
			Buffalo sculpin	*Enophrys bison*		B															1	
			Antlered sculpin	*Enophrys diceraus*		B		1	1					1			1	1	1	1	1	
			Leister sculpin	*Enophrys lucasi*		B														1	1	
				Gymnocanthus detrisus		B															1	
			Armorhead sculpin	*Gymnocanthus galeatus*		B														1	1	
				Gymnocanthus herzensteini		B															1	
			Threaded sculpin	*Gymnocanthus pistilliger*		B														1	1	
			Gilbert's Irish Lord	*Hemilepidotus gilberti*		B														1	1	

			Red Irish lord	*Hemilepidotus hemilepidotus*		B													1	1	
			Yellow Irish lord	*Hemilepidotus jordani*		B													1	1	
			Butterfly sculpin	*Hemilepidotus papilio*		B		1	1					1				1	1	1	
			Brown Irish lord	*Hemilepidotus spinosus*		B														1	
			Longfin Irish lord	*Hemilepidotus zapus*		B													1	1	
			Northern sculpin	*Icelinus borealis*		B													1	1	
			Dusky sculpin	Icelinus burchami		B														1	
			Blacknose sculpin	*Icelus canaliculatus*		B													1	1	
				Icelus cataphractus		B													1	1	
				Icelus euryops		B													1	1	
			Thorny sculpin	*Icelus spiniger*		B													1	1	
				Icelus uncinalis		B													1	1	
			Pacific staghorn sculpin	*Leptocottus armatus*		B													1	1	
			Belligerent sculpin	*Megalocottus platycephalus*		B		1	1					1				1	1	1	
			Norway bullhead	*Micrenophrys lilljeborgii*		B															Iceland - Norwegian Sea
			Brightbelly sculpin	*Microcottus sellaris*		B													1	1	
			Plain sculpin	*Myoxocephalus jaok*		B		1	1					1			1	1	1	1	
			Warthead sculpin	*Myoxocephalus niger*		B													1	1	
			Great sculpin	*Myoxocephalus polyacanthocephalus*		B													1	1	
			Tidepool sculpin	*Oligocottus maculosus*		B													1	1	
			Saddleback sculpin	*Oligocottus rimensis*		B														1	
			Fluffy sculpin	*Oligocottus snyderi*		B													1	1	
				Porocottus mednius		B													1	1	
				Rastrinus scutiger		B													1	1	
			Puget Sound sculpin	*Ruscarius meanyi*		B														1	
			Kelp sculpin	*Sigmistes caulias*		B													1	1	
			Arched sculpin	*Sigmistes smithi*		B														1	
				Stelgistrum beringianum		B													1	1	
			Largeplate sculpin	*Stelgistrum concinnum*		B													1	1	
			Manacled sculpin	*Synchirus gilli*		B														1	
			Longspined bullhead	*Taurulus bubalis*		B							1								
				Thyriscus anoplus		B													1	1	
			Hairhead sculpin	*Trichocottus brashnikovi*		B													1	1	
			Scissortail sculpin	*Triglops forficatus*		B													1	1	
			Roughspine sculpin	*Triglops macellus*		B														1	
			Alaskan sculpin	*Triglops metopias*		B													1	1	
			Moustache sculpin	*Triglops murrayi*		B				1	1	1	1						1		
			Spectacled sculpin	*Triglops scepticus*		B													1	1	
			Flabby sculpin	*Zesticelus profundorum*		B													1	1	
		Hemitripteridae (sailfin sculpins)	Crested sculpin	*Blepsias bilobus*		B													1	1	
			Silverspotted sculpin	*Blepsias cirrhosus*		B													1	1	
			Bigmouth sculpin	*Hemitripterus bolini*		B													1	1	
				Hemitripterus villosus		B													1	1	

			Sailfin sculpin	*Nautichthys oculofasciatus*		B														1
			Eyeshade sculpin	*Nautichthys pribilovius*		B													1	1	1
			Shortmast sculpin	*Nautichthys robustus*		B														1	
		Agonidae (poachers)	Hooknose	*Agonus cataphractus*		B							1								
			Northern spearnose poacher	*Agonopsis vulsa*		B															1
			Smooth alligatorfish	*Anoplagonus inermis*		B														1	1
			Alligatorfish	*Aspidophoroides monopterygius*		B				1	1	1									
			Gray starsnout	*Bathyagonus alascanus*		B															1
			Spinycheek starsnout	*Bathyagonus infraspinatus*		B															1
			Blackfin poacher	*Bathyagonus nigripinnis*		B														1	1
			Bigeye poacher	*Bathyagonus pentacanthus*		B															1
			Rockhead	*Bothragonus swanii*		B															1
			Warty poacher	*Chesnonia verrucosa*		B															1
				Freemanichthys thompsoni		B														1	1
			Fourhorn poacher	*Hypsagonus quadricornis*		B														1	1
			Bering poacher	*Occella dodecaedron*		B														1	1
			Pygmy poacher	*Odontopyxis trispinosa*		B															1
			Dragon poacher	*Percis japonica*		B														1	1
			Tubenose poacher	*Pallasina barbata*		B														1	1
			Sturgeon poacher	*Podothecus accipenserinus*		B		1											1	1	1
			Snail-fin poacher	*Podothecus sachi*		B														1	1
				Podothecus sturioides		B														1	1
			Sawback poacher	*Sarritor frenatu* s		B														1	1
			Longnose poacher	*Sarritor leptorhynchus*		B														1	1
			Smooth-eye poacher	*Xeneretmus leiops*		B															1
		Psychrolutidae (fathead sculpins)	Spinyhead sculpin	*Dasycottus setiger*		B														1	1
			Smoothcheek sculpin	*Eurymen gyrinus*		B														1	1
			Whitetail sculpin	*Malacocottus aleuticus*		B														1	1
			Blackfin sculpin	*Malacocottus kincaidi*		B														1	1
			Darkfin sculpin	*Malacocottus zonurus*		B														1	1
			Tadpole sculpin	*Psychrolutes paradoxus*		B														1	1
			Blob sculpin	*Psychrolutes phrictus*		B														1	1
			Soft sculpin	*Psychrolutes sigalutes*		B														1	1
			Grunt sculpin	*Rhamphocottus richardsonii*		B														1	1
		Cyclopteridae (lumpfishes)	Smooth lumpsucker	*Aptocyclus ventricosus*		B														1	1
				Cyclopteropsis bergi		B														1	
			Bumpy lumpsucker	*Cyclopteropsis inarmatus*		B														1	
				Cyclopteropsis lindbergi		B														1	
			Lumpfish	*Cyclopterus lumpus*	1	B				1	1	1	1								
			Pimpled lumpsucker	*Eumicrotremus andriashevi*		B		1	1	1	1			1			1		1	1
				Eumicrotremus asperrimus		B														1	1
				Eumicrotremus barbatus		B														1	1
				Eumicrotremus gyrinops		B														1	1

			Pacific spiny lumpsucker	*Eumicrotremus orbis*		B													1	1
				Eumicrotremus pacificus		B													1	1
			Toad lumpsucker	*Eumicrotremus phrynoides*		B													1	1
				Eumicrotremus soldatovi		B														1
				Lethotremus muticus		B														1
		Liparidae (snailfishes)	Cherry snailfish	*Allocareproctus jordani*		B													1	1
			Combed snailfish	*Allocareproctus kallaion*		B														1
			Peach snailfish	*Allocareproctus tanix*		B													1	1
			Goldeneye snailfish	*Allocareproctus unangas*		B													1	1
			Whiskered snailfish	*Allocareproctus ungak*		B													1	1
				Careproctus bowersianus		B													1	1
			Bigeye snailfish	*Careproctus candidus*		B													1	1
				Careproctus canus		B													1	1
			Alaska snailfish	*Careproctus colletti*		B													1	1
				Careproctus comus		B													1	1
			Falcate snailfish	*Careproctus cypselurus*		B													1	1
				Careproctus ectenes		B														1
			Mischievous snailfish	*Careproctus faunus*		B														1
				Careproctus furcellus		B													1	1
			Smalldisk snailfish	*Careproctus gilberti*		B														1
				Careproctus mollis		B													1	1
				Careproctus opisthotremus		B														1
				Careproctus ostentum		B													1	1
				Careproctus phasma		B													1	1
				Careproctus rastrinus		B													1	1
				Careproctus simus		B													1	1
				Careproctus spectrum		B														1
				Careproctus trachysoma		B													1	1
				Careproctus zachirus		B														1
				Crystallias matsushimae		B													1	1
				Crystallichthys cameliae		B													1	1
				Crystallichthys cyclospilus		B													1	1
			Blackbelly snailfish	*Elassodiscus caudatus*		B														1
				Elassodiscus tremebundus		B													1	1
				Gyrinichthys minytremus		B														1
			Atlantic seasnail	*Liparis atlanticus*		B				1										
				Liparis bristolensis		B		1	1	1				1	1	1	1	1	1	1
			Spotted snailfish	*Liparis callyodon*		B													1	1
			Ribbon snailfish	*Liparis cyclopus*		B													1	1
			Marbled snailfish	*Liparis dennyi*		B														1
			Tidepool snailfish	*Liparis florae*		B														1
			Slipskin snailfish	*Liparis fucensis*		B													1	1
			Pouty seasnail	*Paraliparis garmani*		B				1										

				Liparis grebnitzkii		B												1		
			Lobefin snailfish	*Liparis greeni*		B														1
			Striped seasnail	*Liparis liparis*		B						1	1							
				Liparis mednius		B												1		
				Liparis megacephalus		B														1
				Liparis micraspidophorus		B														1
			Montagus seasnail	*Liparis montagui*		B							1							
			Slimy snailfish	*Liparis mucosus*		B														1
				Liparis ochotensis		B												1		1
			Showy snailfish	*Liparis pulchellus*		B												1		1
			Ringtail snailfish	*Liparis rutteri*		B												1		1
			Tanaka's snailfish	*Liparis tanakae*		B												1		1
				Liparis tessellatus		B												1		
			Pygmy snailfish	*Liparis nanus*		B												1		1
				Lopholiparis flerxi		B												1		1
			Tadpole snailfish	*Nectoliparis pelagicus*		B												1		1
			Lowfin snailfish	*Paraliparis calidus*		B				1	1	1								
			Swellhead snailfish	*Paraliparis cephalus*		B														1
			Blacksnout seasnail	*Paraliparis copei copei*		B				1	1	1	1							
			Red snailfish	*Paraliparis dactylosus*		B														1
			Prickly snailfish	*Paraliparis deani*		B														1
			Pouty seasnail	*Paraliparis garmani*		B				1	1	1								
			Ebony snailfish	*Paraliparis holomelas*		B												1		1
				Paraliparis hystrix		B				1	1	1	1							
				Paraliparis pectoralis		B												1		1
			Broadfin snailfish	*Paraliparis ulochir*		B														1
				Prognatholiparis ptychomandibularis		B														1
			Slim snailfish	*Rhinoliparis attenuatus*		B												1		1
			Longnose snailfish	*Rhinoliparis barbulifer*		B												1		1
			Bigeye snailfish	*Temnocora candida*		B														1
	Stephanoberyciformes	**Melamphaidae (bigscale fishes)**	Highsnout melamphid	*Melamphaes lugubris*		B												1		1
	Stomiiformes	**Gonostomatidae (bristlemouths)**	Deep-water bristlemouth	*Cyclothone atraria*		B												1		1
			Slender fangjaw	*Sigmops gracilis*		B												1		1
		Sternoptychidae (sea hatchetfishes)	Silvery lightfish	*Maurolicus muelleri*		B				1	1	1	1							
				Polyipnus matsubarai		B												1		1
		Stomiidae (barbeled dragonfishes)	Shiny loosejaw	*Aristostomias scintillans*		B														1
			Pacific viperfish	*Chauliodus macouni*		B												1		1
	Syngnathiformes	**Syngnathidae (Pipefishes)**	Bay pipefish	*Syngnathus leptorhynchus*		B														1
	Tetraodontiformes		Oceanic puffer	*Lagocephalus lagocephalus*		B							1					1		1
	Zeiformes	**Oreosomatidae (oreos)**	Oxeye oreo	*Allocyttus folletti*		B												1		1
Chondrichthyes	Carcharhiniformes	**Scyliorhinidae (cat sharks)**	Blackmouth catshark	*Galeus melastomus*		B															Iceland - Norwegian Sea
			Small-spotted catshark	*Scyliorhinus caniculus*		B															Norwegian Sea
	Chimaeriformes	**Chimaeridae (shortnose chimaeras)**	Rabbit fish	*Chimaera monstrosa*		B						1	1							

	Lamniformes	**Lamnidae (mackerel sharks)**	Salmon shark	*Lamna ditropis*		B												1	1	
			Porbeagle	*Lamna nasus*		B					1	1	1							
	Rajiformes	**Rajidae (skates)**	Broad skate	*Amblyraja badia*		B														Okhotsk Sea
			Starry ray	*Amblyraja radiata*		B			1	1	1	1	1							Bb Brts EG Hb WG
			Deep-sea skate	*Bathyraja abyssicola*		B												1	1	
			Aleutian skate	*Bathyraja aleutica*		B												1	1	
			Sandpaper skate	*Bathyraja interrupta*		B												1	1	
			Commander skate	*Bathyraja lindbergi*		B												1		
			White-blotched skate	*Bathyraja maculata*		B												1	1	
			Butterfly skate	*Bathyraja mariposa*		B												1	1	
			Whitebrow skate	*Bathyraja minispinosa*		B												1	1	
			Alaska skate	*Bathyraja parmifera*		B												1	1	
			Leopard skate	*Bathyraja panthera*		B												1		
			Spinytail skate	*Bathyraja spinicauda*		B				1	1	1	1							
			Mud skate	*Bathyraja taranetzi*		B					1	1								
			Roughtail skate	*Bathyraja trachura*		B												1	1	
			Okhotsk skate	*Bathyraja violacea*		B					1									
			Blue skate	*Dipturus batis*		B					1									Iceland - Norwegian Sea
			Sailray	*Dipturus linteus*		B														Iceland - Norwegian Sea
			Norwegian skate	*Dipturus nidarosiensis*		B														Iceland - Norwegian Sea
			Longnosed skate	*Dipturus oxyrinchus*		B														Iceland - Norwegian Sea
				Leucoraja circularis		B														Iceland - Norwegian Sea
			Shagreen ray	*Leucoraja fullonica*		B							1							Brts
			Big skate	*Raja binoculata*		B													1	
			Thornback ray	*Raja clavata*		B														Iceland - Norwegian Sea
			Longnose skate	*Raja rhina*		B													1	
			Round ray	*Rajella fyllae*		B				1	1	1	1							
			Sailray	*Rajella lintea*		B							1							Iceland - Norwegian Sea
	Squaliformes	**Squalidae (dogfish sharks)**	Pacific spiny dogfish	*Squalus suckleyi*		B														
		Somniosidae (sleeper sharks)	Portuguese dogfish	*Centroscymnus coelolepis*		B				1	1	1	1					1	1	
			Pacific sleeper shark	*Somniosus pacificus*		B												1	1	
Cephalaspidomorphi	Petromyzontiformes	**Petromyzontidae (lampreys)**	Sea lamprey	*Petromyzon marinus*		B							1							Iceland - Norwegian Sea
Myxini	Myxiniformes	**Myxinidae (hagfishes)**	Atlantic hagfish	*Myxine glutinosa*		B				1	1	1	1							552 espèces
Actinopterygii	Albuliformes	**Notacanthidae (spiny eels)**	Spiny eel	*Notacanthus chemnitzii*		WD				1	1	1						1	1	
			Longnose tapirfish	*Polyacanthonotus challengeri*		WD					1	1	1					1	1	
			Smallmouth spiny eel	*Polyacanthonotus rissoanus*		WD				1		1	1							
	Anguilliformes	**Derichthyidae (Longneck eels)**	Narrownecked oceanic eel	*Derichthys serpentinus*		WD						1	1						1	
			Duckbill oceanic eel	*Nessorhamphus ingolfianus*		WD						1	1							
		Serrivomeridae (Sawtooth eels)	Stout sawpalate	*Serrivomer beanii*		WD					1	1						1	1	
		Synaphobranchidae (cutthroat eels)	Deep-water arrowtooth eel	*Histiobranchus bathybius*		WD				1	1	1	1					1	1	
			Kaup's arrowtooth eel	*Synaphobranchus kaupii*		WD				1	1	1	1					1	1	
		Nemichthyidae (snipe eels)	Avocet snipe eel	*Avocettina infans*		WD													1	

	Argentiniformes	**Microstomatidae (pencilsmelts)**	California smoothtongue	*Leuroglossus stilbius*		WD													1	
			Bigscale deepsea smelt	*Melanolagus bericoides*		WD						1	1						1	1
		Platytroctidae (tubeshoulders)	Teardrop tubeshoulder	*Holtbyrnia innesi*		WD					1	1	1						1	1
			Smallscale searsid	*Maulisia microlepis*		WD														Iceland
			Shining tubeshoulder	*Sagamichthys abei*		WD													1	1	EB WB
		Alepocephalidae (slickheads)	California slickhead	*Alepocephalus tenebrosus*		WD														1	#REF!
			Bigeye smooth-head	*Bajacalifornia megalops*		WD				1	1	1							1	1	Bb EB EG WG
			Salmon smooth-head	*Conocara salmoneum*		WD															North-East Atlantic
			Softskin smooth-head	*Rouleina attrita*		WD				1	1	1							1	1	
			Bluntsnout smooth-head	*Xenodermichthys copei*		WD					1	1	1						1		
		Evermannellidae (Sabertooth fish)	Balbo sabretooth	*Evermannella balbo*		WD						1									
		Scopelarchidae (pearleyes)	Zugmayer's pearleye	*Benthalbella infans*		WD						1	1						1	1	
			Short fin pearleye	*Scopelarchus analis*		WD						1	1						1	1	
		Bathysauridae (deepsea lizardfishes)	Long snouted lancetfish	*Bathysaurus ferox*		WD					1	1	1							1	
		Alepisauridae (lancetfishes)	Long snouted lancetfish	*Alepisaurus ferox*		WD						1	1						1	1	
			Short snouted lancetfish	*Alepisaurus brevirostris*		WD				1	1	1							1	1	
		Paralepididae (barracudinas)	Spotted barracudina	*Arctozenus risso*		WD			1	1	1	1	1						1	1	
				Lestidiops sphyraenopsis		WD													1	1	
			Duckbill barracudina	*Magnisudis atlantica*		WD				1	1	1	1						1	1	
			Sharpchin barracudina	*Paralepis coregonoides*		WD					1	1									
	Beloniformes	**Scomberesocidae (sauries)**	Atlantic saury	*Scomberesox saurus*		WD				1	1	1									
		Anoplogastridae (Fangtooth)	Common fangtooth	*Anoplogaster cornuta*		WD				1	1	1							1	1	
		Berycidae (alfonsinos)	Alfonsino	*Beryx decadactylus*		WD						1	1						1	1	
		Diretmidae (Spinyfins)	Longwing spinyfin	*Diretmoides pauciradiatus*		WD						1	1						1	1	
			Silver spinyfin	*Diretmus argenteus*		WD				1		1							1	1	
		Trachichthyidae (Slimeheads)	Orange roughy	*Hoplostethus atlanticus*		WD				1	1	1									
			Mediterranean slimehead	*Hoplostethus mediterraneus*		WD						1	1						1	1	
	Cetomimiformes (Whalefishes)	**Rondeletiidae (Redmouth whalefishes)**	Redmouth whalefish	*Rondeletia loricata*		WD				1	1	1							1	1	
	Clupeiformes	**Engraulidae (anchovies)**	European anchovy	*Engraulis encrasicholus*		WD															North Sea
	Gadiformes	**Macrouridae (grenadiers)**	Abyssal grenadier	*Coryphaenoides armatus*		WD					1	1							1	1	
			Carapine grenadier	*Coryphaenoides carapinus*		WD						1	1								
			Softhead grenadier	*Malacocephalus laevis*		WD															North-East Atlantic
		Moridae (depsea cod)	Blue antimora	*Antimora rostrata*		WD				1	1	1								1	
			Slender codling	*Halargyreus johnsonii*		WD				1	1	1	1						1	1	
			Schmidt's cod	*Lepidion schmidti*		WD															Iceland
			Common mora	*Mora moro*		WD															Iceland
				Guttigadus latifrons		WD					1	1	1								
	Gasterosteiformes	**Syngnathidae (pipefishes)**	Greater pipefish	*Syngnathus acus*		WD															Iceland - Norwegian Sea
	Lamprformes	**Lampridae (opahs)**	Opah	*Lampris guttatus*		WD						1	1							1	
		Trachipteridae (ribbonfishes)	King-of-the-salmon	*Trachipterus altivelis*		WD						1								1	
			Dealfish	*Trachipterus arcticus*		WD				1	1	1	1								
		Regalecidae (oarfishes)	King of herrings	*Regalecus glesne*		WD						1	1						1	1	
		Himantolophidae (Footballfishes)	Atlantic footballfish	*Himantolophus groenlandicus*		WD				1	1	1	1						1	1	

		Oneirodidae (dreamers)		*Dolopichthys longicornis*		WD			1	1	1	1	1						1
			Lobed dreamer	*Dolopichthys pullatus*		WD						1	1						1
				Gigantactis vanhoeffeni		WD						1						1	
			Short-rod anglerfish	*Microlophichthys microlophus*		WD						1	1						1
			Bulbous Dreamer	*Oneirodes eschrichtii*		WD			1	1	1	1	1					1	1
		Linophrynidae (Leftvents)	Soft leafvent angler	*Haplophryne mollis*		WD						1	1						
		Ogcocephalidae (Batfishes)	Atlantic batfish	*Dibranchus atlanticus*		WD						1	1						
				Halicmetus ruber		WD												1	1
		Ceratiidae (seadevils)	Kroyer's deep-sea angler fish	*Ceratias holboelli*		WD				1	1	1						1	1
			Triplewart seadevil	*Cryptopsaras couesii*		WD					1	1	1					1	1
		Caulophrynidae (Fanfins)	Fanfin angler	*Caulophryne jordani*		WD					1	1	1					1	1
	Mugiliformes	**Mugilidae (mullets)**	Flathead grey mullet	*Mugil cephalus*		WD													1
	Myctophiformes	**Myctophidae (lanternfishes)**	Tåning's lanternfish	*Hygophum taaningi*		WD						1	1						
			Diamondcheek lanternfish	*Lampanyctus intricarius*		WD				1		1							
				Lampanyctus photonotus		WD						1	1					1	
			Pygmy lanternfish	*Lampanyctus pusillus*		WD						1							
			Electric lantern fish	*Electrona risso*		WD												1	1
			Mirror lanternfish	*Lampadena speculigera*		WD				1	1	1						1	1
			Rakery beaconlamp	*Lampanyctus macdonaldi*		WD						1						1	1
			Cocco's lantern fish	*Lobianchia gemellarii*		WD						1						1	1
			Topside lampfish	*Notolychnus valdiviae*		WD												1	1
	Ophidiiformes	**Ophidiidae (cusk-eels)**	Blackrim cusk-eel	*Lepophidium profundorum*		WD				1	1								
		Bythitidae		*Thalassobathia pelagica*		WD				1	1	1	1						
		Carapidae (Pearlfishes)	Chain pearlfish	*Echiodon dawsoni*		WD				1	1	1							
	Osmeriformes	**Platytroctidae (tubeshoulders)**	Palebelly searsid	*Barbantus curvifrons*		WD						1	1					1	1
			Bighead searsid	*Holtbyrnia anomala*		WD				1	1	1							
			Teardrop tubeshoulder	*Holtbyrnia innesi*		WD						1	1					1	1
			Bigeye searsid	*Holtbyrnia macrops*		WD						1	1						
				Mentodus rostratus		WD					1	1	1					1	1
			Multipore searsid	*Normichthys operosus*		WD				1	1	1							
			Legless searsid	*Platytroctes apus*		WD				1		1						1	1
			Schnakenbeck's searsid	*Sagamichthys schnakenbecki*		WD						1							
	Perciformes	**Polyprionidae (wreckfishes)**	Wreckfish	*Polyprion americanus*		WD				1	1	1	1						
		Bramidae (pomfrets)	Atlantic pomfret	*Brama brama*		WD				1		1							
			Pacific pomfret	*Brama japonica*		WD												1	1
			Rough pomfret	*Taractes asper*		WD						1							
		Caristiidae (manefishes)	Greenland manefish	*Caristius fasciatus*		WD				1		1							1
		Echeneidae (Remoras)	Spearfish remora	*Remora brachyptera*		WD						1	1					1	1
			Shark sucker	*Remora remora*		WD												1	1
		Howellidae (Oceanic basslets)	Sherborn's pelagic bass	*Howella sherborni*		WD				1		1	1					1	1
		Zoarcidae (eelpouts)		*Lycodes terraenovae*		WD				1	1	1	1						
		Gempylidae (snake mackerels)	Black gemfish	*Nesiarchus nasutus*		WD													
		Scombridae (mackerels and tunas)	Atlantic bonito	*Sarda sarda*		WD						1							

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			Chub mackerel	*Scomber japonicus*		WD													1	1	
			Atlantic bluefin tuna	*Thunnus thynnus*		WD															Iceland - Norwegian Sea
		CentrolophidaeE (medusafishes)	Rudderfish	*Centrolophus niger*		WD				1	1	1									
			Medusafish	*Icichthys lockingtoni*		WD													1	1	
			Opah	*Lampris guttatus*		WD				1		1							1	1	
		Polyprionidae (Wreckfishes)	Wreckfish	*Polyprion americanus*		WD						1	1								
	Pleuronectiformes	**Paralichthyidae (flounders)**	Pacific sanddab	*Citharichthys sordidus*		WD													1	1	
			Speckled sanddab	*Citharichthys stigmaeus*		WD														1	
		Pleuronectidae (righteye flounders)	Deep-sea sole	*Embassichthys bathybius*		WD													1	1	
	Saccopharyngiformes	**Cyematidae (Bobtail snipe eels)**	Bobtail eel	*Cyema atrum*		WD						1	1						1	1	
		Eurypharyngidae (Gulpers)	Pelican eel	*Eurypharynx pelecanoides*		WD				1	1	1	1						1	1	
			Palebelly searsid	*Barbantus curvifrons*		WD							1							1	
		Saccopharyngidae (Swallowers)	Gulper eel	*Saccopharynx ampullaceus*		WD				1	1	1									
	Scorpaeniformes	**Scorpaenidae (scorpionfishes)**	Blackbelly rosefish	*Helicolenus dactylopterus*		WD					1	1	1								
			Rosethorn rockfish	*Sebastes helvomaculatus*		WD														1	
			Shortbelly rockfish	*Sebastes jordani*		WD														1	
			Blue rockfish	*Sebastes mystinus*		WD														1	
			Stripetail rockfish	*Sebastes saxicola*		WD														1	
		Setarchidae (Deep-sea bristly scorpionfishes)	Midwater scorpionfish	*Ectreposebastes imus*		WD						1	1						1		
		Cottidae (sculpins)	Slim sculpin	*Radulinus asprellus*		WD														1	
			Butterfly sculpin	*Hemilepidotus papilio*		WD	1	1	1					1	1	1	1	1	1	1	
		Psychrolutidae (fathead sculpins)	Pallid sculpin	*Cottunculus thomsonii*		WD			1	1	1	1									
		Liparidae (snailfishes)	Blacktail snailfish	*Careproctus melanurus*		WD													1	1	
	Stephanoberyciformes	**Melamphaidae (bigscale fishes)**		*Melamphaes polylepis*		WD						1	1						1	1	
			Crested bigscale	*Poromitra crassiceps*		WD						1	1							1	
				Poromitra megalops		WD			1	1	1	1									
				Scopeloberyx opisthopterus		WD						1	1						1	1	
			Bean's bigscale	*Scopelogadus beanii*		WD					1	1	1								
		Barbourisiidae (red whalefishes)	Velvet whalefish	*Barbourisia rufa*		WD						1	1						1	1	
	Stomiiformes	**Gonostomatidae (bristlemouths)**	Bristlemouth	*Cyclothone alba*		WD						1	1								
			Benttooth bristlemouth	*Cyclothone acclinidens*		WD				1		1	1						1	1	
			Garrick	*Cyclothone braueri*		WD				1		1	1						1	1	
			Veiled anglemouth	*Cyclothone microdon*		WD				1	1	1	1						1	1	
			Tan bristlemouth	*Cyclothone pallida*		WD				1									1	1	
			Slender bristlemouth	*Cyclothone pseudopallida*		WD				1	1	1							1	1	
			Showy bristlemouth	*Cyclothone signata*		WD													1	1	
			Spark anglemouth	*Sigmops bathyphilus*		WD				1	1	1							1	1	
			Elongated bristlemouth fish	*Sigmops elongatus*		WD				1									1	1	
		Sternoptychidae sea hatchetfishes)	Half-naked hatchetfish	*Argyropelecus hemigymnus*		WD						1							1	1	
				Argyropelecus olfersi		WD				1		1									
			Atlantic pearlside	*Maurolicus weitzmani*		WD				1	1	1	1								
				Polyipnus asteroides		WD				1	1	1									
			Constellationfish	*Valenciennellus tripunctulatus*		WD				1		1							1	1	

		Phosichthyidae (Lightfishes)	Slim lightfish	*Ichthyococcus elongatus*		WD													1	1	
			Rendezvous fish	*Polymetme corythaeola*		WD				1		1							1	1	
		Stomiidae (barbeled dragonfishes)	Snaggletooth	*Borostomias antarcticus*		WD				1	1	1									
			Sloane's viperfish	*Chauliodus sloani*		WD				1	1	1	1						1	1	
			Stoplight loosejaw	*Malacosteus niger*		WD				1	1	1							1	1	
			Scaleless black dragonfish	*Melanostomias bartonbeani*		WD													1	1	
			Slender snagletooth	*Rhadinesthes decimus*		WD				1		1							1	1	
			Boa dragonfish	*Stomias boa*		WD				1	1	1	1								
			Longfin dragonfish	*Tactostoma macropus*		WD													1	1	
			Threelight dragonfish	*Trigonolampa miriceps*		WD				1	1	1									
	Syngnathiformes	**Centriscidae (Snipefishes)**	Longspine snipefish	*Macroramphosus scolopax*		WD													1	1	
	Tetraodontoformes	**Balistidae (triggerfishes)**	Grey triggerfish	*Balistes capriscus*		WD															North Sea
		Monacanthidae (Filefishes)	Planehead filefish	*Stephanolepis hispidus*		WD				1		1									
		Molidae (molas)	Ocean sunfish	*Mola mola*		WD							1							1	
	Zeiformes	**Parazenidae (Parazen)**	Rosy dory	*Cyttopsis rosea*		WD				1		1	1						1	1	
		Zeidae (dories)	John dory	*Zeus faber*		WD						1	1								
		Zenionidae (Zeniontids)		*Zenion hololepis*		WD							1						1	1	
Chondrichthyes	Carcharhiniformes	**Triakidae (hound sharks)**	Tope shark	*Galeorhinus galeus*		WD						1								1	
		Carcharhinidae (requiem sharks)	Blue shark	*Prionace glauca*		WD				1	1	1							1	1	
		Chlamydoselachidae (frill sharks)	Frilled shark	*Chlamydoselachus anguineus*		WD							1								
		Hexanchidae (cow sharks)	Bluntnose sixgill shark	*Hexanchus griseus*		WD					1								1	1	
			Sharpnose sevengill shark	*Heptranchias perlo*		WD														1	
	Lamniformes	**Alopiidae (thresher sharks)**	Thresher	*Alopias vulpinus*		WD														1	
		Cetorhinidae (basking sharks)	Basking shark	*Cetorhinus maximus*		WD			1	1	1	1	1						1	1	
	Squaliformes	**Squalidae (dogfish sharks)**	Picked dogfish	*Squalus acanthias*		WD				1	1	1	1								
		Centrophoridae (gulper sharks)	Birdbeak dogfish	*Deania calceus*		WD															
		Etmopterdae (lantern sharks)	Velvet belly	*Etmopterus spinax*		WD						1	1								159 espèces

Comon Name	TAXA	ECOZONE	Arctic Ocean	Canadian Arctic Archipelago	Hudson bay	Baffin Bay / Davis Strait	West Greenland	East Greenland	Barents Sea	Kara Sea	Laptev Sea	East Siberian Sea	Beaufort Sea	Chukchy Sea	Est Bering Sea	West Bering Sea	Okhoskt Sea
Arctic flounder	*Liopsetta glacialis*	A	1	1	1	1	1	1	1	1	1	1	1	1	1		
Polar cod	*Boreogadus saida*	A	1	1	1	1	1	1	1	1	1		1	1	1		
Navaga	*Eleginus nawaga*	A		1													
Sardine cisco	*Coregonus sardinella*	A		1	1	1		1	1	1	1	1	1	1	1		
Arctic cisco	*Coregonus autumnalis*	A		1					1	1	1	1	1	1	1		
Broad whitefish	*Coregonus nasus*	A		1					1	1		1	1	1			
Greenland halibut	*Reinhardtius hippoglossoides*	AB		1	1	1	1	1	1	1	1	1	1	1	1		
Capelin	*Mallotus villosus*	AB			1	1	1	1	1	1				1	1		
Northern wolffish	*Anarhichas denticulatus*	AB			1	1	1	1	1	1							
Rainbow smelt	*Osmerus mordax*	AB	1	1													
Saffron cod	*Eleginus gracilis*	AB											1	1	1		
Pacific herring	*Clupea pallasii*	AB											1	1	1		
Pacific cod	*Gadus macrocephalus*	AB													1		
Atlantic Cod	*Gadus morhua*	B		1	1	1	1	1	1								
Roughhead grenadier	*Macrourus berglax*	B			1	1	1	1	1								
Spotted wolffish	*Anarhichas minor*	B			1	1	1	1	1								
Atlantic herring	*Clupea harengus*	B				1	1	1	1								
Greater argentine	*Argentina silus*	B				1	1	1	1								
Roundnose grenadier	*Coryphaenoides rupestris*	B				1	1	1	1								
Tusk / Cusk	*Brosme brosme*	B				1	1	1	1								
Haddock	*Melanogrammus aeglefinus*	B				1	1	1	1								
Blue whiting	*Micromesistius poutassou*	B				1	1	1	1								
Saithe	*Pollachius virens*	B				1	1	1	1								
Beaked redfish	*Sebastes mentella*	B				1	1	1	1								
Golden redfish	*Sebastes norvegicus*	B				1	1	1	1								
Lumpfish	*Cyclopterus lumpus*	B				1	1	1	1								
Atlantic wolffish	*Anarhichas lupus*	B				1	1	1	1								
Atlantic mackerel	*Scomber scombrus*	B				1	1	1	1								
American plaice	*Hippoglossoides platessoides*	B				1	1	1	1								
Atlantic halibut	*Hippoglossus hippoglossus*	B				1	1	1	1								
European plaice	*Pleuronectes platessa*	B					1	1	1								
Ling	*Molva molva*	B						1	1								
Norway pout	*Trisopterus esmarkii*	B						1	1								
Angler	*Lophius piscatorius*	B						1	1								
Whiting	*Merlangius merlangus*	B							1								
Pollack	*Pollachius pollachius*	B							1								
European whitefish	*Coregonus lavaretus*	B							1								
Pacific halibut	*Hippoglossus stenolepis*	B												1	1		
Alaska pollock	*Gadus chalcogrammus*	B													1	1	
Flathead sole	*Hippoglossoides elassodon*	B													1	1	1
Pacific grenadier	*Coryphaenoides acrolepis*	B													1		
Pacific saury	*Cololabis saira*	B													1		
Rougheye rockfish	*Sebastes aleutianus*	B													1		
Pacific ocean perch	*Sebastes alutus*	B													1		
Silvergray rockfish	*Sebastes brevispinis*	B													1		
Darkblotched rockfish	*Sebastes crameri*	B													1		
Redstripe rockfish	*Sebastes proriger*	B													1		
Yelloweye rockfish	*Sebastes ruberrimus*	B													1		
Broadbanded thornyhead	*Sebastolobus macrochir*	B													1		
Sablefish	*Anoplopoma fimbria*	B													1		
Masked greenling	*Hexagrammos octogrammus*	B													1		
Atka mackerel	*Pleurogrammus monopterygius*	B													1		
Scale-eye plaice	*Acanthopsetta nadeshnyi*	B													1		

	Targueted species	Part of total species
Total	62	7,6%
A	9,7%	9,0%
AB	9,7%	15,8%
B	80,6%	9,1%

Kamchatka flounder	*Atheresthes evermanni*	B													1		
Arrow-tooth flounder	*Atheresthes stomias*	B													1		
Roughscale sole	*Clidoderma asperrimum*	B													1		
Blackfin flounder	*Glyptocephalus stelleri*	B													1		
Rex sole	*Glyptocephalus zachirus*	B													1		
Rock sole	*Lepidopsetta bilineata*	B													1		
Yellowfin sole	*Limanda aspera*	B													1		
Dover sole	*Microstomus pacificus*	B													1		
English sole	*Parophrys vetulus*	B													1		
Alaska plaice	*Pleuronectes quadrituberculatus*	B													1		

Family	total catches	catches	Fish Species		Eco-region	Arctic Ocean and Arctic Basin Seas										Atlantic Gateway		Pacific Gateway		
			Comon Name	Scientific name		AO	WGS	BB/HS	HB	AA	BfS	ESibS	LapS	KaraS	GrS	BrtsS	NorwS	ChukS	EBerS	WBerS
Clupeidae (herrings)	959 327	74 894	**Pacific herring**	*Clupea pallasii*	AB						5							12	13 920	60 957
		884 433	**Atlantic herring**	*Clupea harengus*	B		5 441	2							3 154	170 641	705 195			
			European pilchard	*Sardina pilchardus*	B															
			European sprat	*Sprattus sprattus*	B															
Gadidae (cods)	139 563	951	**Greenland cod**	*Gadus ogac*	A		951													
			Navaga	*Eleginus nawaga*	A															
		15 913	**Polar cod**	*Boreogadus saida*	A						2					15 911				
		122 681	**Pacific cod**	*Gadus macrocephalus*	AB														122 681	
		18	**Saffron cod**	*Eleginus gracilis*	AB													18		
Phycidae (phycid hakes)	2 199 946	#######	**Alaska pollock**	*Gadus chalcogrammus*	B														930 324	232 775
		477 874	**Atlantic Cod**	*Gadus morhua*	B	4	9 698	521						90	31 321	287 354	148 886			
			Blue ling	*Molva dypterygia*	B															
		218 233	**Blue whiting**	*Micromesistius poutassou*	B										8 270	24 038	185 925			
			European hake	*Merluccius merluccius*	B															
			Greater forkbeard	*Phycis blennoides*	B															
		128 466	**Haddock**	*Melanogrammus aeglefinus*	B		1 017	4							1 012	86 572	39 861			
			Ling	*Molva molva*	B															
		581	**Norway pout**	*Trisopterus esmarkii*	B												581			
			Pacific tomcod	*Microgadus proximus*	B															
			Pollack	*Pollachius pollachius*	B															
		205 213	**Saithe**	*Pollachius virens*	B										2 330	38 499	164 384			
		6 480	**Tusk / Cusk**	*Brosme brosme*	B												6 480			
			White hake	*Urophycis tenuis*	B															
			Whiting	*Merlangius merlangus*	B															
Osmeridae (smelts)	11 066	10 794	**Capelin**	*Mallotus villosus*	AB			49							10 745					
		272	**Rainbow smelt**	*Osmerus mordax*	AB									272						
			Eulachon	*Thaleichthys pacificus*	B															
			European smelt	*Osmerus eperlanus*	B															
Salmonidae (Salmons)	332 408	840	**Broad whitefish**	*Coregonus nasus*	A				17	6	16	400	256	97				48		
		97	**Dolly varden**	*Salvelinus malma malma*	A						2							95		
		875	**Muksun**	*Coregonus muksun*	A							118	644	113						
		828	**Arctic cisco**	*Coregonus autumnalis*	A							266	557					5		
		2 728	**Sardine cisco**	*Coregonus sardinella*	A							1 625	1 040	54			env. 5000	9		
		6	**Bering cisco**	*Coregonus laurettae*	AB													6		
		83 321	**Pink salmon**	*Oncorhynchus gorbuscha*	AB						3							1	61 775	21 542
		676	**Arctic char**	*Salvelinus alpinus alpinus*	B				486	173	17									
		26	**Atlantic salmon**	*Salmo salar*	B				26											
			Chinook salmon	*Oncorhynchus tshawytscha*	B															
		125 652	**Chum salmon**	*Oncorhynchus keta*	B						73							597	62 711	62 271
			Coho salmon	*Oncorhynchus kisutch*	B															
			European whitefish	*Coregonus lavaretus*	B															
		117 064	**Sockeye salmon**	*Oncorhynchus nerka*	B														96 292	20 772
		295	**Sheefish / Inconnu**	*Stenodus leucichthys*	B				6	3	88							198		
Pleuronectidae (righteye flounders)	101 107	57 060	**Greenland halibut**	*Reinhardtius hippoglossoides*	AB		28 809	7 761	447						5 521	8 161	6 361			
			Starry flounder	*Platichthys stellatus*	AB															
			Alaska plaice	*Pleuronectes quadrituberculatus*	B															
		80	**American plaice**	*Hippoglossoides platessoides*	B			80												
			Arrow-tooth flounder	*Atheresthes stomias*	B															
			Atlantic halibut	*Hippoglossus hippoglossus*	B															
			Common dab	*Limanda limanda*	B															
			Comon sole	*Solea solea*	B															
			Dover sole	*Microstomus pacificus*	B															
			English sole	*Parophrys vetulus*	B															
			European flounder	*Platichthys flesus*	B															
			European plaice	*Pleuronectes platessa*	B															
			Flathead sole	*Hippoglossoides elassodon*	B															
			Kamchatka flounder	*Atheresthes evermanni*	B															
			Lemon sole	*Microstomus kitt*	B															

			Pacific halibut	*Hippoglossus stenolepis*	B														
			Pacific sand sole	*Psettichthys melanostictus*	B														
			Petrale sole	*Eopsetta jordani*	B														
			Rex sole	*Glyptocephalus zachirus*	B														
			Rock sole	*Lepidopsetta bilineata*	B														
			Witch flounder	*Glyptocephalus cynoglossus*	B														
		43 967	**Yellowfin sole**	*Limanda aspera*	B													43 967	
			Pacific sanddab	*Citharichthys sordidus*	WD														
Scophthalmidae (turbots)			**Brill**	*Scophthalmus rhombus*	B														
			Turbot	*Psetta maxima*	B														
			Megrim	*Lepidorhombus whiffiagonis*	B														
Anarhichadidae (wolffishes)	765	33	**Northern wolffish**	*Anarhichas denticulatus*	AB	33													
		732	**Atlantic wolffish**	*Anarhichas lupus*	B		601	131											
			Spotted wolffish	*Anarhichas minor*	B														
Macrouridae (grenadiers)	3		**Roughhead grenadier**	*Macrourus berglax*	B														
		3	**Roundnose grenadier**	*Coryphaenoides rupestris*	B			3											
Cottidae (sculpins)			**Fourhorn sculpin**	*Myoxocephalus quadricornis*	A														
Cyclopteridae (lumpfishes)	8 708	8 708	**Lumpfish**	*Cyclopterus lumpus*	B		8 708												
Scorpaenidae (scorpionfishes/redfishes)	24 546		**Black rockfish**	*Sebastes melanops*	B														
			Bocaccio rockfish	*Sebastes paucispinis*	B														
			Cabezon	*Scorpaenichtys marmoratus*	B														
			Canary rockfish	*Sebastes pinniger*	B														
		22 814	**Deepwater redfish**	*Sebastes mentella*	B		2 465	7							20 342				
			Norway redfish	*Sebastes viviparus*	B														
		1 732	**Ocean perch**	*Sebastes marinus*	B										1 732				
			Pacific ocean perch	*Sebastes alutus*	B														
			Shortspine thornyhead	*Sebastolobus alascanus*	B														
			Widow rockfish	*Sebastes entomelas*	B														
			Yellowtail rockfish	*Sebastes flavidus*	B														
			Blackbelly rosefish	*Helicolenus dactylopterus*	WD														
Scomberesocidaee (sauries)	159 337	159 337	**Pacific saury**	*Cololabis saira*	B														159 337
Alepocephalidae (slickheads)			**Baird's slickhead**	*Alepocephalus bairdii*	B														
Anoplopomatidae (sablefishes)			**Sablefish**	*Anoplopoma fimbria*	B														
Argentinidae (argentines/smelts)			**Argentine**	*Argentina sphyraena*	B														
			Greater argentine	*Argentina silus*	B														
Carangidae (jacks and popanos)			**Atlantic horse mackere**	*Trachurus trachurus*	B														
Hexagrammidae (greenlings)	53 155	53 155	**Atka mackerel**	*Pleurogrammus monopterygius*	B													53 155	
			Lingcod	*Ophiodon elongatus*	B														
Belonidae (needlefishes)			**Garfish**	*Belone belone*	B														
Labridae (wrasses)			**Ballan wrasse**	*Labrus bergylta*	B														
Moridae (depsea cod)			**Longfin codling**	*Laemonema longipes*	B														
Lophiidae (goosefishes)			**Angler**	*Lophius piscatorius*	B														
Scombridae (mackerels and tunas)	41 385	41 385	**Atlantic mackerel**	*Scomber scombrus*	B											15 076	26 309		
			Albacore	*Thunnus alalunga*	WD														
			Atlantic bluefin tuna	*Thunnus thynnus*	WD														
			Atlantic bonito	*Sarda sarda*	WD														
			Chub mackerel	*Scomber japonicus*	WD														
Bramidae (pomfrets)			**Atlantic pomfret**	*Brama brama*	WD														
Sparidae (porgies)			**Common pandora**	*Pagellus erythrinus*	B														
Moronidae (temperate basses)			**European seabass**	*Dicentrarchus labrax*	B														
Trachinidae (weeverfishes)			**Greater weever**	*Trachinus draco*	B														
Trichiuridae (cutlassfishes)			**Black scabbardfish**	*Aphanopus carbo*	B														
Trichodontidae (sandfishes)			**Sailfin sandfish**	*Arctoscopus japonicus*	B														
Triglidae (searobins or gurnards)			**Grey gurnard**	*Eutrigla gurnardus*	B														
			Red gurnard	*Chelidonichthys cuculus*	B														
Polyprionidae (wreckfishes)			**Wreckfish**	*Polyprion americanus*	WD														
Trachichthyidae (Slimeheads)			**Orange roughy**	*Hoplostethus atlanticus*	WD														
Sharks			**Greenland shark**	*Somniosus microcephalus*	AB														

			Portuguese dogfish	*Centroscymnus coelolepis*	B													
			Small-spotted catshark	*Scyliorhinus caniculus*	B													
			Nurshound	*Scyliorhinus stellaris*	B													
			Porbeagle	*Lamna nasus*	B													
			Thresher	*Alopias vulpinus*	WD													
			Basking shark	*Cetorhinus maximus*	WD													
			Tope shark	*Galeorhinus galeus*	WD													
			Blue shark	*Prionace glauca*	WD													
			Velvet belly lantern sha	*Etmopterus spinax*	WD													
			Picked dogfish	*Squalus acanthias*	WD													
Squates and rays			**Blue skate**	*Dipturus batis*	B													
			Sailray	*Dipturus linteus*	B													
			Longnosed skate	*Dipturus oxyrinchus*	B													
			Thornback ray	*Raja clavata*	B													
Chimaeras			**Rabbit fish**	*Chimaera monstrosa*	B													
Lampreys			**Sea lamprey**	*Petromyzon marinus*	B													

Cods + haddock	10					10									
Flatfishes	16 449													1 189	15 260
redfishes	27 843		5 735	109	25						10 234	2 758	8 982		
Salmonids	915						50	359	194	132				180	
Sharks and rays	29	29													
smelts	13						13								
Mixed groups	732 421	2	22 909	9 895	13	3	4	830	807	18	3 119	49 815	56 991	111	161 733	426 171
Total fishes	#######	**66**	**86 334**	**18 562**	**1 020**	**195**	**273**	**3 598**	**3 498**	**776**	**97 780**	**698 825**	**1 349 955**	**1 280**	**1 547 747**	**999 085**
											212 102		#######		#######
											4,4%		**42,6%**		**53,0%**

Crustacean Species		**AO**	**WGS**	**BB/HS**	**HB**	**AA**	**BfS**	**ESibS**	**LapS**	**KaraS**	**GrS**	**BrtsS**	**NorwS**	**ChukS**	**EBerS**	**WBerS**
Comon Name	*Scientific name*															
Aesop shrimp	*Pandalus montagui*				22											
Grass shrimp	*Pandalus kessleri*															
Humpback shrimp	*Pandalus hypsinotus*															
Humpy shrimp	*Pandalus gonorius*															
Humpy shrimp	*Pandalus goniurus*															
Northern prawn	*Pandalus borealis*	117	100 679	37 105	33	55				305	5 050	24 987				
Ocean shrimp	*Pandalus jordani*															
Sidestripe shrimp	*Pandalopsis japonica*															
Norway lobster	*Homarus gammarus*															
Dungeness crab	*Cancer magister*															
Hair crab	*Erimacrus isenbeckii*															
Pacific rock crab	*Cancer productus*															
Plue king crab	*Paralithodes platypus*															
Queen crad	*Chionoecetes opilio*															
Red deepsea crab	*Chaceon quinquedens*															
Red king crab	*Paralithodes camtschaticus*															
Same-spine stone crab	*Lithodes aequispinus*															
Spiny king crab	*Paralithodes brevipes*															
	King crabs														8 169	
	Pacific snow crabs														13 393	
	Pandalus shrimps					25										
	Crustaceans															9 533
	Total custaceans **199 473**	**117**	**100 679**	**37 105**	**55**	**80**	**0**	**0**	**0**	**305**	**5 050**	**24 987**	**0**	**0**	**21 562**	**9 533**
											143 391		**24 987**			**31 095**
											71,9%		**12,5%**			**15,6%**

Mollusc Species		**AO**	**WGS**	**BB/HS**	**HB**	**AA**	**BfS**	**ESibS**	**LapS**	**KaraS**	**GrS**	**BrtsS**	**NorwS**	**ChukS**	**EBerS**	**WBerS**
Comon Name	*Scientific name*															
Blue mussel	*Mytilus edulis*															

Butter clam	*Saxidomus gigantea*															
Hen clam	*Mactra sachalinensis*															
Pacific lettleneck clam	*Prototthaca staminea*															
Pacific razor clam	*Siliqua patula*															
Stimpsons surf clam	*Macromeris polynyma*															
Iceland scallop	*Chlamys islandica*															
Weathervane scallop	*Patinopecten caurins*															
Pullet carpet shell	*Tapes pallustra*															
Sand gaper	*Mya arenaria*															
Nothern quahog	*Mercenaria mercenaria*															
Ocean quahog	*Arctica islandica*		15 846													
Pacific cupped oyster	*Crassostrea gigas*															
Pacific geoduck	*Panopea abrupta*															
Japanese flyingsquid	*Todarodes pacificus*															2 920
Neon flying squid	*Ommastrephes bartramii*															
European flying squid	*Todarodes sagittatus*															
Longfin squid	*Loligo pealeii*															
Northern shortfin squid	*Illex illecebrosus*															
	Scallops									13						
	Squids															48 570
	Molluscs															74 580
	Total molluscs 141 929	**0**	**15 846**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**126 070**
											15 859		**0**			**126 070**
											11,2%		**0,0%**			**88,8%**
	Total catches in 2006 #######	**185**	**202 860**	**55 668**	**1 075**	**275**	**272**	**3 598**	**3 498**	**1 094**	**102 830**	**723 811**	**1 349 956**	**1 290**	**1 569 310**	**1 134 687**
											371 355		#######			#######
											7,2%		**40,3%**			**52,5%**

AO : Arctic Ocean LME
WGS : West Greenland Shelf LME
GrS : Greenland Shelf/Sea LME
BB/HS : Baffin Bay / Hudson Bay LME
HB : Hudson Bay LME
AA : Arctic Archipelago LME
BfS : Beaufort Sea LME
ESibS : East Siberian Sea LME
LapS : Laptev Sea LME
KaraS : Kara Sea LME
BrtsS : Brents Sea LME
NorwS : Norwegien Sea LME
ChukS : Chukchi Sea LME
EBerS : East Bering Sea LME
WBerS : West Bering Sea LME