Marine Mammals: A Multifaceted Resource

(Appendices and corresponding text tables revised in August- 2021)

"Feeding Bodies and Souls"

Greenlandic boy with dried humpback whale meat © F. Ugarte

To be cited as: NAMMCO 2017. Marine Mammals: A multifaceted Resource. (Revised version from August 2021). Available at https://nammco.no/topics/other_documents/

1. WHY NOT CONSIDER MARINE MAMMALS?

Since pre-historic times, stranded or hunted marine mammals have represented resources in terms of food and materials for many coastal communities worldwide, as testified by their appearance in rock carvings, legends, writings, literature and art. In the Arctic, their wide distribution and abundance make them the predominant component of the marine ecosystem. Now, as in the past, they are a logical and necessary food resource. Their year-round availability has enabled small, remote and isolated northern coastal communities to survive and to maintain a relatively high degree of self-sufficiency in food production. Small-scale coastal whaling and sealing were not only a source of food, commodities, trading currency and cash, but also represented a cultural and societal keystone and were the mainstay of many coastal communities, particularly in Greenland.

Subsistence coastal whaling and sealing were conducted in a largely sustainable manner but became undermined as commercial whaling and sealing developed. The large-scale systematic hunting for profit lead to serious declines in many of the world's populations of marine mammals, to the point of collapse of most of the major whale stocks and the extinction of some pinniped species. As a result, marine mammal hunting became a worldwide symbol of mismanagement and abuse of natural resources.

The emergence of the modern environmental ethic coupled with the development of precautionary and effective management procedures (by population and stock), as well as the demise of the demand for whale and seal oil, brought an end to large scale whaling and sealing by the mid-1980s. Although a few remain critically endangered, many stocks of marine mammals have since recovered from exploitation and are considered healthy (Gambell 1999, Clapham *et al.* 1999, Costa *et al.* 2006, Laidre *et al.* 2015, Thomas *et al.* 2015, Clapham 2016, IWC[1] 2016[2], Smith *et al. in* UN[3] 2016) and are thus able to sustain controlled removals.

Today whaling and sealing are still a reality for many northern coastal communities, simply because marine mammals are present, nearby and abundant, and therefore a logical resource to use in an environment of scarcity. They continue to represent an invaluable resource providing food and/or income, as well as job opportunities in places where non-marine resources are limited and/or employment opportunities are few.

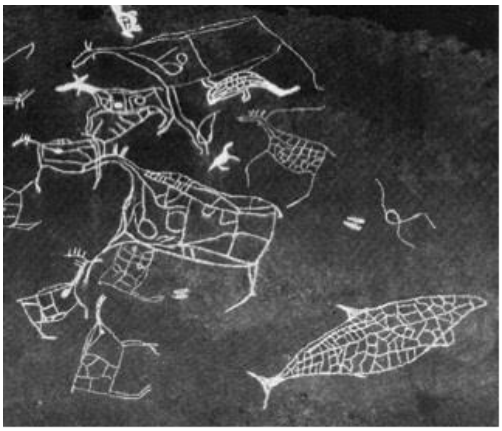
Although the capacity for sustainable management has been built up through progress in the development of precautionary management procedures, targeted stocks are healthy, and locally sustainably exploited marine mammals represent an ecosystem-friendly, low-carbon footprint resource, the exploitation of marine mammals remains controversial and demonised, stamped as uncivilised and barbaric – barely acceptable as subsistence activities for those marginal "aboriginals" or "natives".

Food insecurity is recognised as one of the major concerns of the 21st century and is, particularly in the Arctic, exacerbated by climate change. Some marine mammals represent valuable potential contributors to food security in many places. Nevertheless, they are ignored as potential food resources in the general discourse on food security (Godfray *et al.* 2010, UN 2014, 2015, FAO 2016, Potts *et al.* 2016, WEF 2016). The UN General Assembly (UN 2014) recognises the important role played by seafood in global food security and defines seafood as including "*all marine living resources used for food, including fish, shellfish, crustaceans,* ***marine mammals****, sea turtles and algae* (our emphasis)*".*

[1] International Whaling Commission
[2] https://iwc.int/status, retrieved June 2016
[3] United Nations

It underlines that *"this definition promotes a holistic view of the contribution of seafood to global food security*". Marine mammals are mentioned as a possible important source of nutrition, in particular for certain groups of indigenous peoples and it is also noted that they are not as widely consumed for a variety of reasons. After this mention, however, the potential of marine mammals as contributors to food security is simply not examined further.

With a focus on the northern regions, we examine the potential of marine mammals as a food resource in the light of both the "*blue economy"* and climate and environmental change, in an environmental, dietary and societal perspective. We look at their abundance, our ability to manage them sustainably, their ecological footprint and explore why marine mammal resources are currently ignored in the context of food security.



Petroglyph from South Norway depicting a whale.

2. Marine Mammals, an Abundant and Logical Resource in the North

Marine mammals have been and are still consumed as human food all around the world (e.g., Shoemaker 2005, Robards and Reeves 2011). In the northern latitudes, marine mammals have, however, acquired a special significance because of their abundance when compared to the scarcity of land resources.

2.1 An abundant resource in a world of scarcity.

The Arctic environment of the NAMMCO countries is characterised by an inhospitable environment and climate, with limited usable land resources. Both flora and fauna in this environment have low diversity and quantity and are limited by a short summer growing season. In sharp contrast, the marine environment bursts with diverse and abundant resources, including fish, crustaceans, sea birds and marine mammals. The fish fauna is, however, impoverished compared to lower latitudes, although a few important species abound in some areas. Sometimes these abundant fish species occur in deeper waters, which until relatively recently could not be effectively taken with indigenous fishing technology (e.g., Greenland halibut, shrimp, and crab). In contrast to the limited fish resources, several species of marine mammals (seals and whales) are permanent residents accessible to hunters. Migratory warm-blooded species (including birds and whales) arrive also in abundance in the summer months to feed on the seasonally available marine invertebrates (Freeman 2001).

Animal diets, including those of humans, reflect the resource availability within their specific environments, leading to geographical variation within and between species. Human diets in the Arctic have been and still are dominated by marine resources and technical limitations in fishing methods dictated that until recently they were heavily centred upon marine mammals. The reliance on locally

available resources is reinforced by limitations in transport infrastructure due to the large distances between northern settlements and the harsh landscape. In Greenland, for example, no roads connect the towns on the mainland. Many communities are isolated for months of the year due to the presence of sea ice, and food shipments can't get through by sea. As a result, the use of locally available wildlife, and in particular marine mammals, is enshrined in northern cultures, and are reflected in long-standing cultural traditions. Due to their abundance and widespread distribution, marine mammals represent, now as in the past, an obvious and logical food resource in the Arctic.

2.2 AN ABUNDANT RESOURCE

Twenty-three marine mammal species are permanent residents in the NAMMCO management area: seven pinniped (seal) species and sixteen cetaceans (whale and dolphin) species. Polar bears are also resident, but the conservation of that species is not within the remit of NAMMCO.

All Arctic marine mammal species and many sub-Arctic species have been harvested at some point and many still are today. Their population dynamics are driven by harvests, past and present. High historic levels of catches depleted many populations, but a reduction in harvest has allowed several species and stocks to increase, and they are now able to sustain controlled levels of removals. In other cases, declines triggered by harvest continue although harvest has ceased, and are likely due to other climate induced changes (e.g., hooded seals, Øigård *et al.* 2014). The abundance of both different species and stocks of the same species varies greatly, and consequently their conservation and exploitation status must be looked at individually.

2.2.1 Pinnipeds

Of the seven pinniped (seal) species which are permanent residents in the NAMMCO management area, five species are so-called ice seals, i.e., species which are dependent on the presence of ice for several or all phases of their life cycle (e.g., breeding, moulting, whelping), and two species are coastal seals, i.e., not requiring ice in any phase of their life cycle. All seven species experience some level of removals, both direct catch and by-catch, although at different levels for different stocks. The population trends vary between species and stocks. Table 1 below gives the abundance of seal stocks in the NAMMCO area, trends in abundance, type and recent level of removals. More detailed data are reported in Appendix 1, together with all relevant caveats and references.

Most stocks hunted within the NAMMCO area are subject to regular monitoring and assessments. The exceptions are ringed seals and bearded seals, due in part to the difficulty in reliably estimating their population sizes. These two species have a wide and patchy distribution in a remote habitat, which makes them very difficult to survey. Populations are, however, believed to be over a million for ringed seals and several 100,000s for bearded seals, and both species are listed as *Least Concern* by the IUCN[4].

The conservation measures in place for pinnipeds within NAMMCO ensure a population increase for most previously depleted populations, as exemplified by the West Greenland stock of walrus (see Figure 1 under point 2.3.1.2). Coastal seals (grey and harbour seals) are under different management regimes in Iceland and Norway, which aim to stabilise their populations at a predefined level (e.g., NAMMCO 2016a). Strict protection is given to species or stocks of uncertain trend status or declining populations, as for example harbour seals and grey seals in Greenland, and northeast Atlantic hooded seals.

[4] Ringed seal: http://www.iucnredlist.org/details/41672/0 and bearded seal: http://www.iucnredlist.org/details/8010/0

Table 1. Abundance of seals (most recent estimates) in the NAMMCO area, trends in abundance, type of removals and yearly average catches in 2015-2019 (see Appendix 1 for a more detailed table and references).

Species	Areas of Direct Relevance to NAMMCO	Population abundance	95% Confidence Interval	Trend	Removals (Country)*	Annual Removal mean for years 2015-2019
Harp seal	White/Barents Sea	1,497,189	1,292,939-1,701,440		DCQ (NO), P (RU)	NO: **574**
	Greenland Sea	426,808	313,005-540,612	↗?	DCQ (NO), DC (GL)	NO: **2,839** GL: **1,515**
	Northwest Atlantic	7,445,000	6,426,000-8,354,000	→	DCQ (CA), DC (GL), BC, SL	GL: **50,857**
Hooded seal	Greenland Sea	76,623	58,299-94,947	↘	SC (NO), DC (GL)	NO: **17** GL: **124**
	Northwest Atlantic	592,100	404,400-779,800	↗	DCQ (CA), DC (GL), SL, BC	GL: **1,406**
Ringed seal	Labrador	Unknown			DC (CA+GL)	
	Baffin Bay - Davis Strait (incl. West Greenland) *Part of Baffin Bay* *West Greenland*	ca. 1,200,000 *787,000* *185,000*	(estimate from polar bear consumption)		DC (CA+GL)	GL: **40,211**
	Southwest Greenland	Unknown			DC (GL)	
	East Greenland *Scoresbysund and Kong Oscars Fjords*	Unknown *30,000*			DC (GL)	GL: **7,207**
	Svalbard *Spitsbergen*	Unknown *7,585***			DC (NO)	NO: **55**
	Bartens & Kara seas (from East Svalbard) *Kara Sea*	Unknown *150,000*	 *6,332-9,085*		DC (RU)	
Bearded seal	West Greenland *North Water*	ca. 250,000 *6,005*	 *4,070-8,858*		DC (GL)	WGL: **875**
	Southwest and east Greenland	Unknown			DC (GL)	EGL: **353**
	Svalbard and Barents sea *Svalbard*	Unknown *1,000s*			 *DC*	 *NO: **21***
Walrus	Baffin Bay *Greenland - North Water*	 *1,279*	 *938 - 1744*	↗	DCQ (CA+GL), SL *DCQ (GL), SL*	 *GL: **60***
	West Greenland-Southeast Baffin Island *West Greenland aggregation*	Unknown *1,408*	 *922-2,150*	↗	DCQ(CA+GL), SL	 *GL: **51***
	East Greenland	1,429	616-3,316	→	DCQ	GL: **7**
	Svalbard / Franz Joseph Land *Svalbard*	Unknown *5,503*	 *5,031-6,036*	 *(↗)*	Protected *Protected 1952*	
Grey Seal	Greenland	New sp. (2009)			Protected 2010	
	Iceland	6,269	5,375-7,181	↘?	Protected§ 2019, BC	IS: **35.6**
	Faroe Islands	550**			Protected 2020, BC	FO: **90.4**
	Norway (total)	3,850	3,504-4,196	↘	DCQ, BC	NO: **64**
	Trøndelag -Nordland	*Pup prod.: 332*		*↘*	*DCQ, BC*	*NO: (Trøndelag quota = 0 from 2015)*
Harbour seal	West Greenland				DC	
	South-Southeast Greenland				Protected 2010, BC	WGL: **7 in 2015-16 then 0**
	Iceland	9434**	6,149-12,726	→	Protected§ 2019, BC	IS: **83**
	Faroe Islands	Extirpated ~ 1850				
	Norway (Total)	5,787** (not incl. Finnmark)		↘	DC, BC	NO: **366**
	Svalbard	1812**			Protected	

In blue: stock component of the above stock
** DC, direct; DCQ, with quota; BC, By-catch; SC, Scientific; SL, Struck and lost*
FO, Faroe Islands, GL, Greenland, IS, Iceland; NO, Norway, E, East; W, West; N, Nord, S, South.
*** Minimum estimate*
§ In Iceland, special hunting permission can be granted for subsistence purposes, see Appendix 3.

2.2.2 Cetaceans

Six species of baleen whales and 10 species of toothed whales are common permanent residents in the NAMMCO area. Only a few of them are the target of direct removals, although many of them are subjected to some level of by-catch – both at different levels for different stocks. Table 2 below gives the abundance of stocks of large whale that are hunted in the NAMMCO area, trends in abundance, type and recent level of removals. Appendix 2 provide more detailed data on those stocks as well as other whale and dolphin stocks, together with all relevant caveats and references.

There are four species of baleen whales harvested in the NAMMCO area: fin, humpback, minke and bowhead whales. Population and growth rates estimated in the northeast Atlantic (i.e., excluding west Greenland) for fin whales is over 35,000 and 4%; for humpbacks over 12,000 and up to 12% but levelling off; for minke over 145,000 and different trends by area; and for bowheads over 3,500 and increasing. The stocks of each of the four species are regularly monitored and assessed. They are harvested under strict quota regimes and the populations of fin, humpback and bowhead whales are all increasing (Heide-Jørgensen *et al.* 2007, Víkingsson *et al.* 2015, Víkingsson 2016, IWC[5]). The present levels of removals are considered under the maximum sustainable yield for all stocks (Clapham *et al.* 1999, Thomas *et al.* 2015). The trends for minke whales are less clear and vary by area, however there are currently no concerns, considering the present level of catch (IWC[6])

The overall conservation status is less well defined for the smaller cetaceans, such as pilot whales, dolphins, and harbour porpoises. Although direct takes are at present believed to be sustainable, by-catches may be significant (especially for harbour porpoises) and are not well estimated yet. Abundance data and by-catch estimates are presently being collected to allow a full assessment of these species. The NAMMCO Working Group on By-Catch will meet in April 2017 and will review by-catch estimates of harbour porpoises as well as other species.

2.3 A HIGHLY VALUED AND THEREFORE CAREFULLY MANAGED RESOURCE

The abundance and conservation status of marine mammal species has varied both in time and between stocks of the same species. The amount of historical and present information available to managers for each stock also varies. Management measures must be precautionary and reflect how reliably the conservation status can be assessed. The precautionary approach looks at how reliable the estimates and trends in the population are, and how good the data on e.g., stock structure, past and present abundance and removals is. It also must consider the potential impact of any other stressors on the population.

2.3.1 Strict management of resources ensuring healthy stocks

Following the over-exploitation of many stocks and concerns related to animal welfare, the use of marine mammals has become controversial, resulting in a strongly voiced opinion that marine mammals should not be hunted. Avery positive consequence of this is that the management procedures developed and adopted by most hunting nations for assessing stock conservation status and the effect of direct catches have become highly complex and precautionary, much more so than management procedures developed for fisheries. Management by population and stock, the only biologically relevant management level, was introduced in the mid-1970s by the IWC and "*led to the development of the present highly precautionary scientific management procedures developed by the International Whaling Commission's Scientific Committee for commercial and aboriginal subsistence whaling to ensure that past mistakes will not be repeated.*" (IWC 2015[7]).

[5] IWC - Status of whales, https://iwc.int/status; and population estimate, https://iwc.int/estimate
[6] Ibid
[7] Background information on the status of whales, International Whaling Commission. Retrieved September 2015. https://iwc.int/status

Table 2. Abundance (most recent estimates) of large whale species that are hunted in the NAMMCO area, trends in abundance, type of removals and yearly average catches in 2015-2019. (See Appendix 2 for a more detailed table of all cetacean species and reference)

Species	Basin// Regions - Management Areas//Sub-areas//Sub-units in blue are a component of the above Subarea	Abundance	95% Confidence Interval (or CV)	Trend	Removals (Country)**	Annual Removal mean for years 2015-2019
Bowhead whale	**Arctic**	**>> 25,000**		(↗)		
	Baffin Bay- Davis Strait	6,446 p,a	3,838-10,827	(↗)	DCQ(CA+GL)	
	"WGL winter component"	*1,538*	*827-2,249*	(→)	*DCQ*	*GL: **0.2***
	Spitsbergen	Unknown			Protected	
	NEGL	*318 p,a*	*110-956*			
	NE Water Polynya	*301 p,a*	*127-769*	(↗)		
	Svalbard North	*343 a*	*136-862*	(↗)		
Fin Whale	**North Atlantic Basin**	**>> 79,000**	**CV=0.13**	(↗)		
	West Greenland	2,215 p,a	1,017-8,823	↘	DCQ	GL: **9**
	East Greenland Coastal	6,440 p,a	3,901-10,632	single estimate	Protected	
	East Greenland - West Iceland	36,773 p	25,811-52,392	↗	DCQ	IS: **60**
	East Iceland - Faroes (EI+F)				No catch	
	Norwegian and Barents Sea	11,387p	8,072-16,063	(→)	Protected	
Humpback whale	**Total North Atlantic**	**>> 15,000**				
	West Greenland	993 p,a	578-3,022	↘	DCQ	GL: **5**
	East Greenland Coastal	4,223 p,a	1,845-9,666	single estimate	Protected	
	Iceland -Faroes	9,867 p	4,854-20,058	(→)	Protected	
	Barents and Norwegian Sea	10,708 p	4,906-23,370	(→)	Protected	
Minke whale	West Greenland	5,095 p,a	1,753-10,085	→	DCQ	WGL: **146, 133**
	East Greenland	2,762 p,a	1,153-6,235	single estimate	DCQ	EGL: 11, 6
	Iceland Coastal (CIC)	13,497 p,a	CV=0.18	→	DCQ	NO: **736, na**
	Iceland Pelagic (Iceland-Faroes)	42,515 p				
	Svalbard-Bear Island West (ES)	**100,615 p,a**				
	Eastern Barents Sea (EB)		CV=0.36	↘ // north & eastward shift	DCQ	NO: 0, 0
	Eastern Norwegian Sea (EW)		19,942-65,658	→?	DCQ	IS: **24, 36**
	North Sea/West UK		4,498-35,912	↘ // north & eastward shift	DCQ	

Abundance estimates which are not corrected for perception bias (p) and availability (a) bias are de facto minimum estimates, as they are not corrected for (p) animals missed by the observers nor (a) because they are below the surface when the ship passes.

** The management regions differ per species*

*** DC, direct; DCQ, with quota; BC, By-catch; SC, Scientific; SL, Struck and lost*

FO, Faroe Islands, GL, Greenland, IS, Iceland; NO, Norway, E, East; W, West; N, Nord, S, South.

2.3.1.1 IWC large whale management procedure

The IWC, an organisation which can hardly be accused of being pro-whaling, describes the IWC Revised Management Procedure for large whales as follows: *"The Revised Management Procedure or RMP is the rigorously-tested mechanism that the IWC's Scientific Committee has developed to allow it to provide advice on safe, risk-averse catch limits for commercial whaling of baleen whales" (IWC 2016[8]).*

[8] The Revised Management Procedure - A Detailed Account, International Whaling Commission. Retrieved July 2016. Https://Iwc.Int/Rmp2

Catches are only allowed on abundant populations and then only at levels that will allow the stocks to remain healthy. Regular monitoring is an important and integral part of the RMP.

The RMP is considered a safeguard against depletion, with uncertainty included as an independent factor. The greater the uncertainty, the smaller the quotas are. Stock surveillance is embedded in the process with surveys required every five years or else quotas will be phased out. Catch and count data are entered in the model and the output is regularly adjusted. No hunting is permitted for depleted stocks (considered depleted compared to historical data). Hunting is (meant to be) strictly regulated and controlled, so that the numbers provided for the models are reliable.

2.3.1.2 Management in NAMMCO's framework

Like many international agreements[9], NAMMCO has adopted as the three fundaments of its management policy *Sustainability, Ecosystem Approach to Management (EA)* and *Best Practices.* The principle of sustainability has been established as one of the general principles of the UNCLOS 1982[10] and is defined as the "*optimum sustainable utilisation of renewable resources".* It implies the use of resources at rates that do not exceed the capacity of Earth to replace them, i.e., development *"that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED 1987). Key commitments regarding the sustainable development[11] and use of the oceans have been agreed as part of the outcomes of the major summits on sustainable development the last 30 years[12]. EA considers the use of resources, i.e., human activities, as an integral part of the ecosystem. Best practices entail using the best knowledge, methodology and technology at one's disposal to achieve the most efficient or prudent course of action to ensure success. It is also the commitment to keep abreast of improvements and developments as these appear.

Management advice in NAMMCO is based on safe and precautionary approach processes which ensure that only healthy stocks are exploited and at such levels that they remain healthy. It also attempts to incorporate the likely consequences of climate change and the escalating anthropogenic impact on the environment. NAMMCO management advice is formulated as responses to requests from Council by the Scientific Committee of NAMMCO. The responses are developed by the Scientific Committee based on the advice of Expert/Working Groups including external experts, i.e., scientists from research institutions from non-NAMMCO countries. It is supported by regular monitoring of marine mammal stocks which provide regularly updated scientific data on stock size and status. Management measures taken by the countries as well as catch data are annually reported to the Commission. Although NAMMCO has only an advisory mandate, this reporting allows NAMMCO to see whether the advice given has been followed and to monitor the effectiveness of the management actions. Assessment of the stocks is done at regular intervals, the frequency depending on the species and the robustness of their conservation status. Management recommendations are regularly reviewed and adjusted as new information becomes available. Table 3 provides an overview of the various management measures in place in NAMMCO countries. The legal instruments supporting these measures are given in Appendix 3. Some stocks are fully protected, some are harvested under a quota regime, while the harvest of others is open.

For seals, all quotas are set following the advice of the Scientific Committee of NAMMCO channelled through the Management Committee for Seals and Walrus. NAMMCO Scientific Committee bases its

[9] Many other international instruments also advocate an integrated/ecosystem-based/ecosystem approach to oceans management (e.g., the Law of the Sea, the Convention on Biological Diversity (CBD), the 1992 Agenda 21, the 2002 World Summit on Sustainable Development, UN General Assembly 2006 Resolution on Oceans and the Law of the Sea, the 2001 Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, the OSPAR Convention, the Arctic Council (2013)).

[10] UN Convention on the Law of the Sea (UNCLOS) sets out the legal framework within which all activities in the oceans and seas must be carried out. Particularly relevant to marine mammals are articles 64 and 65.

[11] "*Successful sustainable development therefore requires integrated approaches that ensure sustained and inclusive economic growth, social development and environmental protection, or so-called "triple wins""* (UN 2015).

[12] The 1992 UN Conference on Environment and Development, the nineteenth special session of the General Assembly on the programme for the further implementation of Agenda 21, the 2000 Millennium Summit of the United Nations, the 2002 World Summit on Sustainable Development and the 2010 High-level Plenary Meeting of the General Assembly on the Millennium Development Goals.

advice on the work of Expert/Working Groups including scientists from research institutions from non-NAMMCO countries and sometimes in cooperation with other international management organisations (e.g., harp and hooded seal quotas are based on the advice of the Joint ICES-NAFO-NAMMCO Working Group on harp and hooded seals).

Table 3. Overview of management measures for marine mammal species in NAMMCO countries.
See Appendix 3 for a more complete list and the reference to the relevant legal instruments.

	Cetaceans		**Seals and walrus**	
	Hunting allowed	***Protected***	***Hunting allowed***	***Protected***
Faroes	***With restriction on areas, time periods and methods:*** Long-finned pilot whale White-sided dolphin White-beaked dolphin Bottlenose dolphin Harbour porpoise	All other cetacean species All cetacean species around fish farms		Grey seals (the only resident species is de facto protected by a combination of regulations)
Greenland	***West Greenland***: Bowhead whale **(quota)** Fin whale **(quota)** Humpback whale **(quota)** Beluga **(quota)** ***Both West and East GL:*** Minke whale **(quota)** Narwhal **(quota)** Killer whale Pilot whale Bottlenose whale White-sided dolphin White-beaked dolphin Harbour porpoise	All other cetacean species and / or areas	*In both West and East Greenland:* Walrus (**quota**) Hooded seal Harp seal Ringed seal Bearded seal	Grey seal, Harbour seal *For others seal species:* - lactating females and pup pairs - pups with lanugo hair ('white-coats') – so in practice for harp, ringed, and bearded seals that are species with laguno hair.
Iceland	Fin whale **(quota)** Minke whale **(quota)**	All other cetacean species	Permission can be requested for personal use: Grey seal Harbour seal (the only two resident species)	All
Norway excl. Svalbard	Minke whale **(quota)**	All other cetacean species	***Pack ice hunt*** Harp seal **(quota)** Hooded seal (**quota - since 2007 quota=0)** ***Coastal seals*** Grey seal **(quota)** Harbour seal **(quota)** ***Permission can be granted during special time periods:*** Ringed seal Harp seal	Other seal species All seal species around fish farms
Svalbard	Minke whale (**quota)**	All other species	***Only permitted outside breeding season in the following periods:*** Bearded seal: 01/02-27/04 + 05/06-30/11 Ringed seal 01/02-20/03 + 20/05 – 30/11	Walrus All seals other than bearded and ringed seals are fully protected During breeding season bearded and ringed seals are also protected

For cetaceans, the picture is more diverse. For the large cetaceans (fin, humpback, bowhead and minke whales), Greenland is following the scientific advice of the IWC for aboriginal subsistence whaling. If the IWC does not issue advice for a specific year, then Greenland follows the advice of NAMMCO.
For beluga and narwhal, Greenland follows the advice of the Greenland Canada Joint Commission on Narwhal and Beluga (JCNB), which bases its advice on the NAMMCO/JCNB Joint Working Group on Narwhal and Beluga. For the smaller cetaceans, Greenland has not implemented a quota system, and the sustainability of the catches is assessed by NAMMCO when and if required. Norway bases its hunting quota for minke whales on the scientific advice of both the IWC and NAMMCO. Iceland bases its hunting quota for fin and minke whales on the scientific advice of NAMMCO.

NAMMCO believes that regional management is more effective than global management, as it involves the resource-using communities, which is essential for successful conservation practices. Both marine mammal users and managers need to be committed to the conservation and sustainable use of marine mammals. It is easier to feel committed to advice when it comes from peers as opposed to advice which comes from a "top-down" approach.

NAMMCO has established itself as an effective body and an appropriate organisation for the rational management, conservation, and study of north Atlantic marine mammals (e.g., Hardy 2006, Caddell 2013). A good example of this successful regional management is the case of Greenland, where harvest quotas were recommended by NAMMCO for belugas, narwhals, and walrus. In some cases, the quotas initially drastically reduced the harvests and therefore the livelihood and resources of the hunters and local communities (going from a yearly catch of 700 belugas to a recommended quota of 100 for example (NAMMCO 2001, p. 18 & 142)). Nevertheless, within a few years the recommended quotas were implemented (beluga in 2004, narwhal in 2004 for West Greenland and 2008 for East Greenland, walrus in 2007), and population increases were seen in the depleted stocks. Examples of this effective management are shown in Figure 1 which gives the population trajectories for West Greenland belugas and walrus and their inflexion after the implementation of quotas.

NAMMCO promotes strict, effective and adaptive management procedures based on scientific knowledge informed by local knowledge, where monitoring and periodic assessment reviews are core elements in order to

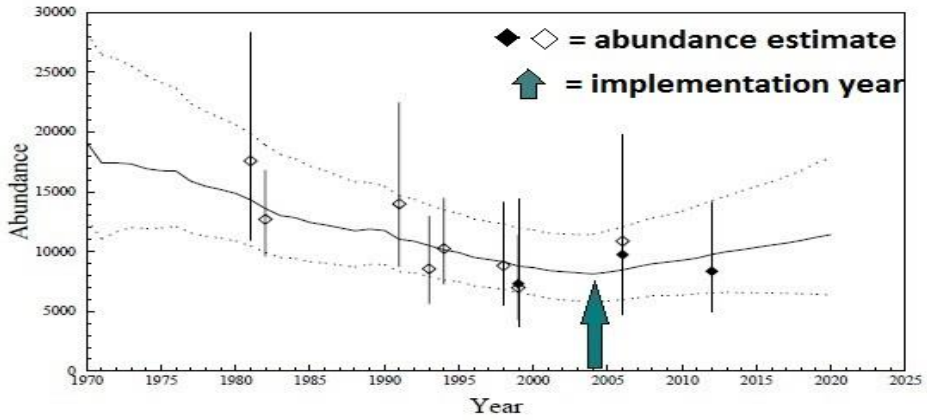
- obtain information on trends in the conservation status of the species concerned and thus examine the effectiveness of the management measures,
- adjust the measures to the diverse changes that may occur, either in response to the measures themselves or to changing external factors.

To evaluate the quality and reliability of the management advice provided to the countries and the appropriateness of the responses, NAMMCO will undertake an external Performance Review in 2017.

2.3.2 A responsibly managed resource – welfare issues

People's right to utilise natural resources lies at the very core of NAMMCO, as does the obligation to hunt in a sustainable and responsible manner. For NAMMCO *the use of marine mammals is ethically defensible if it is sustainable and does not cause unnecessary suffering to animals*. This view is rooted in the ethical issues raised by any harvest of wild resources: the justification behind the harvest, the level of consumption/utilisation of the catch, the amount of fear or pain (caused by the hunting method), and the efficiency of the hunt. In 2004, a Workshop on Hunting Methods for Seals and Walrus (NAMMCO 2005) recommended that "…hunters should make every effort to reduce unnecessary suffering by hunted animals, by minimizing killing times and avoiding letting injured animals escape. Such efforts should have priority for all hunts."

Hunters should strive for an NAMMCO Committee on Hunting Methods provides advice on hunting methods for the marine mammals relevant to NAMMCO member countries. The advice given is based on the best available scientific findings, technological developments and traditional and local knowledge, with due consideration given to safety requirements, animal welfare concerns and the efficient



utilisation of the animal.

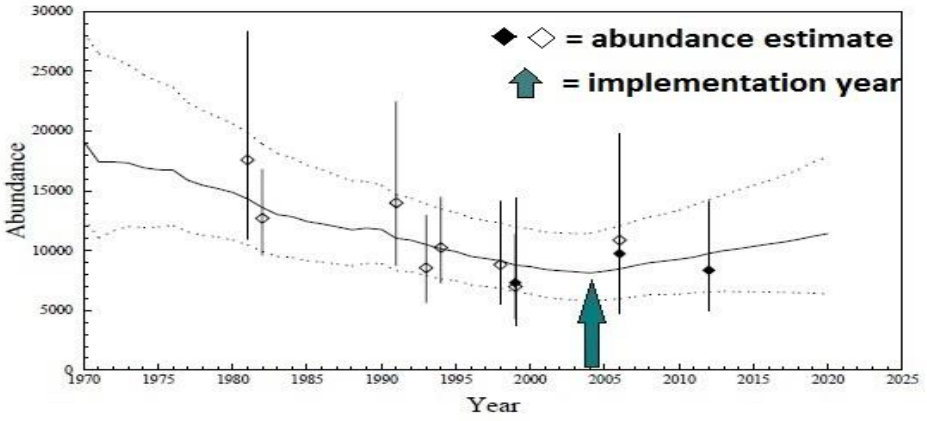


Figure 1. *Population trajectories for West Greenland belugas (top) and walrus (bottom). Quotas, green arrows, were introduced for WG belugas in 2004 and for walrus in 2007.*

The increasing effectivity and efficiency in hunting methods following from the use of high-tech hunting gear, such as harpoon guns, penthrite grenades, rifles, and outboard motors, contribute to decreasing the length of the chase and the time to death, thus accommodating concerns over welfare issues. Using these technological advances is in keeping with northerners' tradition of flexibility and adaptability, which has enabled them to survive under changing conditions. There is no permanent cultural attachment of Inuit hunters to any form of technology, as new technological traditions are created as the need arises (Caufield 1997). Efficiency should be the primary goal – not referring to the number killed but to the method used and the efficiency and rapidity of the kill and the securing of the killed animal.

Highly successful improvements in hunting methods have been achieved within NAMMCO's jurisdiction. The instantaneous death rate in the Norwegian minke whale hunt has, for example, increased from 17% in 1982 to 82% in 2012 due to the development of the penthrite grenade. Efficient killing – with respect to time and pain - depends on the experience and education of the hunters. In NAMMCO there has always been a strong emphasis on the importance of hunter training. To this end NAMMCO has developed hunting manuals[13] for the different whale hunts in the NAMMCO area. Training courses are mandatory for most kinds of hunt in NAMMCO countries (Icelandic and Norwegian

[13] http://www.nammco.no/publications/hunting-committee/hunting-manuals/

whale hunts, Faroese pilot whaling, Norwegian sealing, see in Appendix 4 for details). Furthermore, NAMMCO has carried out shooting trials[14] to examine the effect of different rifle projectiles to make hunting safer and more effective.

In effect, NAMMCO is today the only international organisation specifically and successfully working on the improvement of marine mammal hunting methods. NAMMCO is also the only international organisation that has implemented an Inspection and Observation Scheme for monitoring marine mammal hunting activities in its area, which - acting alongside but independently from the national inspection schemes - supports transparency. Appendix 4 describes the different hunts carried out by NAMMCO countries and the systems in place for training hunters, as well as those for monitoring and inspecting these hunting activities.

3. MARINE MAMMALS, A GREEN-BLUE RESOURCE

3.1 A NATURAL RESOURCE

Like the harvest of other wild food sources, whaling and sealing do not involve the confinement and transport of live animals and the related animal welfare issues and waste of lives. The animals develop and thrive in a natural way and at their own pace in the wild, in their species-specific natural social units with no human interference.

They grow in a natural way, healthy and undisturbed until they are killed. They move around freely, and they are born, live and die in an environment that might be full of dangers but is their natural environment. The human intrusiveness and the human-caused suffering, if any, is only associated with the killing and only lasts a tiny fraction of the animals' lifetime.

There is, however, an important caveat to this, that the animals grow solely *healthy and undisturbed* if the environment is *healthy and undisturbed* since their health and well-being reflects the state of their environment. Pollution and other anthropogenic disturbances are increasingly jeopardising the health of the marine environment and decreasing the fitness and health of marine mammals. Reproductive failure linked with PCB-induced reproductive toxicity in smaller cetaceans in European waters is a sad example of this (e.g., Murphy *et al.* 2015, Jepson and Law 2016 – see chapter 4.3.1 for more detail).

3.2 A RESOURCE IN BALANCE WITH THE ENVIRONMENT[15]

When coastal whaling and sealing are carried out sustainably, the collateral environmental costs are restricted to the activities of the whaling or sealing boats. When sealing and whaling are conducted from land, these environmental costs are eliminated. The various negative environmental impacts associated with agriculture, farming, and fishing, especially when those are conducted on an industrial scale, are not present in whaling or sealing.

Similar to the harvest of other wild food sources, whaling and sealing require no intensive farming techniques. Recent agricultural practices that have greatly increased global food supply have had inadvertent, detrimental impacts on the environment and on ecosystem services (Tilmann *et al.* 2002). The environmental nightmare represented by beef, pork, and poultry production is well documented (e.g., Steinfeld 2006, Goodland and Anhang 2009, UNESCO 2010). Today "the livestock sector emerges as one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global" (Steinfeld *et al*. 2006). It includes

[14] http://www.nammco.no/about-nammco/committee-on-hunting-methods/guidelines-and-shooting-trials-for-ammunition/

[15] Added in August 2021: see also Ziegler et al. 2021. Available at https://www.mdpi.com/2304-8158/10/6/1194

deforestation, land degradation and desertification[16], contamination of groundwater, pollution of soil and air, unsustainable use of water and groundwater extraction, use of fossil fuel, release of greenhouse gases, loss of wildlife habitat and biodiversity, reduction of genetic diversity, release of chemical additives – pesticides, herbicides, hormones, and antibiotics. Cattle excrete polluting nutrients. The largest share of GHG (Green House Gas) emissions is from methane (CH_4) and nitrous oxide (N_2O), which emanates from the enteric fermentation of ruminants and is also released from stored manure (e.g., GEAS 2012). Issues of such great concern have directly led to the question of whether intensive agricultural practices are ethically sound (e.g., Lal *et al.* 1988).

Commercial fishing also generates collateral concerns. Bottom trawling is associated with large scale disruption of the seabed and benthic habitat destruction. Fishing is furthermore associated with – so far largely uncontrolled and sometimes quite high – by-catch and discard of non-target species, including protected and threatened ones, including a concerning number of marine mammals (e.g., Alverson *et al.* 1994, Read *et al.* 2006, Sims *et al.* 2008, Reeves *et al.* 2013). The role of fishery by-catch as a factor hindering the recovery of marine mammal populations is increasingly recognised (e.g., Read 2008, Reeves *et al.* 2013). In contrast, whaling and sealing are highly selective food production techniques, with no coincidental by-catch and "waste" of non-target species. Furthermore, targeted animals can be selected not only by species, but also by size and for some species by sex, which allows for selective management measures and can help reduce the threat to the reproductively active component of the population (e.g., Freeman *et al.* 1998).

The carbon footprint of locally exploited and consumed marine resources is clearly much less than that of any alternative imported resources. For many northern communities, much of the imported food is flown in with the carbon footprint of that transport adding to that of the production. A survey in 2007[17] by a pro-whaling lobby organisation covering eight of Norway's 30 whaling vessels showed that the average emission of carbon dioxide was 1.9 kg per kg of whale meat, compared with 15.8 for beef, 6.4 for pork and 4.6 for chicken. The "carbon footprint" was calculated up to the first sale -- for whales the landing point and for livestock the farm gate and did not include the carbon involved in processing nor transport to shops[18].

When harvests do not exceed the reproductive capacity of stocks, local whaling and sealing provide an environmentally friendly contribution to the planet's food supply. Locally hunting marine mammals is one of the environmentally-sound ways of acquiring food for human consumption today: the environment remains unaffected, energy use is low in relation to yield, and there is no pollution from fertilisers, pesticides, or other chemicals.

The sustainable, energy-efficient, low carbon footprint and non-polluting use of local renewable resources should be seen as an ecological ideal. In an environmental perspective, it is better that the Faroese, Greenlanders, Icelanders, and Norwegians sustainably hunt whales and seals locally rather than import food from far abroad, using non-renewable fossil fuel. The environmental cost of replacing marine mammal meat in the diet of marine mammal consumers is not negligible in the Arctic, when locally produced alternative meat or greens are not available or are very limited. Although whaling and sealing contribute little to food production in global terms, they do contribute to reducing pollution of the land and seas that result from chemically intensive and high carbon footprint modern agricultural and fishery practices. Also, ensuring food security through the use of local food resources limits transport and transportation needs. This fits well with the existing limited infrastructure in the Arctic. Any development of new infrastructure for transportation would likely be environmentally costly.

[16] http://www.un.org/en/events/desertificationday/background.shtml

[17] Reuters, Environment, Mar 4 2008; http://uk.reuters.com/article/2008/03/04/environment-climate-whaling-dc-idUKL0340706220080304

[18] Added in August 2021: see also Ziegler et al. 2021. Available at https://www.mdpi.com/2304-8158/10/6/1194

The awareness of the ecological benefits and sustainable character of coastal whaling and sealing (including indigenous practices), besides their societal importance, is increasing. Martin Lidegaard, former foreign minister of Denmark said in 2015 to Deutche Welle[19] during a visit in Greenland: "The seals up here have lived a very good life, they are hunted in a very sustainable way. The meat is eaten by the Greenlanders and the fur is then sold. That's as sustainable as it gets… I don't see any fur being more sustainable than that which comes from seals." Eva Garde, a biologist at WWF[20], says [21]: "*It [the hunt] is a lifestyle still based on finding food just outside one's door and the WWF prefers that Greenlanders trap seals than import chicken and increase the world's carbon dioxide footprint*." In November 2013, both the WWF and Greenpeace came out in favour of Greenland's seal hunt**,** which they labelled sustainable, and of the people of Greenland being allowed to continue hunting seals[22,23,24].

3.3 A RESOURCE CONTRIBUTING TO BLUE GROWTH

Coastal nations around the world develop the management of marine resources around a novel concept termed the "Blue Economy" or "Blue Growth". The blue economy initiative promotes global sustainability by focusing on the planet's single largest resource, the oceans. It seeks to generate as much economic value from the marine environment as possible based on new technologies, thus securing more sustainable livelihoods in coastal areas, but doing so in a sustainable way that conserves and protects the sea's resources and ecosystems.

Blue Economy offers an integrated approach to the increasing need for cooperation and coordination among all stakeholders and at all levels of government for more sustainable fisheries management and more effective conservation (Norden 2015). Blue Economy is the maritime concept parallel to the Rio+20[25] Green Economy initiative and espouses the same desired outcome, namely: "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" while endorsing the same principles of low carbon, resource efficiency and social inclusion (UNEP[26] 2013).

In the absence of an accepted definition, the WWF (2015[27]) has developed a set of "Principles for a Sustainable Blue Economy". Whaling and sealing under NAMMCO's umbrella meet many of the relevant criteria. Besides the elements given above, the processes leading to the management advice in NAMMCO are inclusive, well informed, transparent, holistic, cross sectoral, as well as innovative and proactive. Management advice is based on scientifically sound information and an adaptive and precautionary ecosystem approach. Furthermore, NAMMCO actively shares the information, knowledge and lessons learned with other countries conducting the same activities.

By contributing to food security, generating employment and cash opportunities, and supporting familial, societal and cultural ties (see point 6), whaling and sealing in NAMMCO countries contribute to improving human wellbeing. At the same time, they represent low carbon and resource efficient activities. The precautionary and scientific approach to management, seeking to integrate the possible effects of various human activities, supports healthy or increasing populations thus reducing ecological scarcity and environmental risks. By providing provisioning services (food and raw materials), while maintaining cultural (recreational, spiritual, educational, and cognitive) and supporting (nutrient cycling, carbon sequestration) services, sustainable and responsible whaling and sealing increase the economic value of the marine environment, thus contributing to Blue Economy.

[19] http://www.dw.com/en/greenlanders-way-of-life-heads-for-extinction/a-18377697
[20] World Wildlife Fund
[21] http://arcticjournal.com/culture/241/environment-groups-ok-greenland-seal-hunt
[22] http://arcticjournal.com/culture/environment-groups-ok-greenland-seal-hunt
[23] http://sermdev.umlaut.revealit.dk/politics/308/sealskin-all-rage-copenhagen
[24] https://www.theguardian.com/world/2015/may/16/greenland-inuits-urge-eu-reverse-seal-ban-save-way-of-life
[25] 2012 UN summit on sustainable development in Rio de Janeiro
[26] United Nation Environment Programme
[27] http://www.wwf.se/source.php/1605623/15_1471_blue_economy_6_pages_final.pdf

Blue Economy endorses the principles of resource efficiency, among other things endorsing strategies to prevent discard in fisheries. Coastal whaling and sealing for food is traditionally very resource efficient. Taking seals as an example, the essential product is meat for human consumption, but flippers and some internal organs, bones and ligaments are also used. Any surplus is given to sled dogs - which also contribute to hunting and fishing, and the skins are used for clothing. Seal products in the past were used to produce other equally important items such as oil for lamps, tools, kayaks and tents, and they were and are still used for decoration, handicrafts and jewellery. The essential value is subsistence, but the skins, although a by-product, generate an added economic value from the seal, in the cash necessary to acquire other commodities and food, as well as in covering the cost of the hunting. The ban on seal products and fur, are *de facto* also affecting Inuit sealing, with the consequence in Greenland that very few skins are sold and tanned. Great Greenland, a fur company and one of the biggest employers in Greenland, had to close its last sewing workshop in January 2016. The livelihoods of the Greenlanders have been decreased due to market failure, but the seals are still hunted since their main service is to provide food for humans.

The price of the skins has dramatically decreased, resulting in some hunters not being able to afford to hunt anymore. Recently, the Council of Canadian Academies (2013) has shown that hunger in the North results partly from the fact that the cost of hunting is now out of reach for most families[28]. The same is true in Greenland. A columnist for the True North Times recently reflected the frustration in northern communities as "Seals are cute, but starvation is ugly."[29]

In a Blue Economy perspective, the ban on sealskin products does not make sense since it just reduces resource efficiency. It makes hunters' livelihoods less sustainable, thus decreasing human well-being and social equity, while not reducing any environmental risks or ecological scarcities but increasing discard. In many cases, seal skin fabrics are more environmentally friendly than any other fabrics.

Coming back to the Martin Lindegaard quote "*The seals are hunted in a very sustainable way. The meat is eaten by the Greenlanders and the fur is then sold. That's as sustainable as it gets*". One should now say ***was*** *as sustainable as it could get*. Marine mammals are the predominant component of the Arctic marine ecosystem, and logically any development based on the use of local resources has and will continue to involve the use of marine mammals.

4. MARINE MAMMALS UNDER THREAT

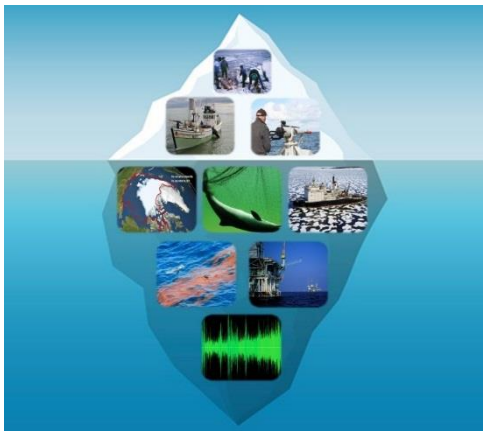
Hunting removals – largely controlled and reported and thus included in management schemes - are only the most apparent anthropogenic pressure that marine mammals face. In this chiefly post-whaling and sealing world, a wide range of threats are more significant, almost all of them human-caused and with sometimes less tangible but greater effective impacts (e.g., Clapham 2016).

"Although whaling has now receded, there is, sadly, a sizable list of threats to cetacean populations, almost all of them human-caused. Some of these impacts are well documented, while the effects of others are less tangible" (Clapham 2016)

Marine mammals face multiple, cumulative, and possibly synergistic anthropogenic threats, although virtually nothing is known about the cumulative impacts. Impacts of various human activities on whales and seals range from direct mortality to injury, fitness impairments and disturbance of normal

[28] http://www.scienceadvice.ca/en/assessments/completed/food-security.aspx
[29] http://www.truenorthtimes.ca/2014/03/29/seals-are-cute-but-starvation-is-ugly/

behaviour, as well as indirect effects on habitat quality and prey availability. Environmental change is not restricted to global warming alone. The build-up of marine contaminants is one of the many environment changes that shares causal elements with global warming. It is exacerbated by the build-up of microplastics. Both could potentially affect northern, and eventually worldwide, marine ecosystems (which also include humans) just as severely as global warming (Fielding 2010, Jepson *et al.* 2016, Jepson and Law 2016, Law and Thompson 2014).



Although they attract the most focus, hunting removals are only the visible part of the iceberg of threats facing marine mammals (Fig. 2). Hunting is also the most controlled human impact and the easiest to act upon through quota and inspection. Understanding the full palette of human impacts and quantifying their effects as much as possible is essential for getting long-term population dynamics right and for carefully and sustainably managing marine mammal stocks.

***Figure 2**. Iceberg of threats to marine mammals. © NAMMCO*

4.1 A CHANGING ARCTIC AS BACKGROUND

Like ecosystems in the rest of the world, Arctic ecosystems are affected by the many changes associated with climate change, albeit at a faster and greater rate. The Arctic warms at twice the rate of the global average, increasing the likelihood of severe impacts in the region (ACIA[30] 2005, IPCC[31] 2007, 2013, 2014). The consequential effects on snow and ice were already felt in small communities throughout the circumpolar north by mid-2000 (UNEP[32] 2007). The dramatic shrinking of the ice cover and the changing patterns of sea ice formation alter both animal distribution and migration routes as well as the accessibility to resources, making hunting harder (e.g., see [33]). The impacts on wildlife will vary according to the specific ecology of the different species, from likely severe negative impacts on ice-dependent species to likely positive impacts on seasonally migrating sub-arctic species. Overall, the impacts and consequences of climate change are very difficult to predict.

Marine mammals, like any other elements of the Arctic ecosystem, will most likely be strongly affected by climate change. The loss of Arctic sea ice is one of the most directly visible aspects of climate change and a key parameter that will affect Arctic marine mammal populations. The impact will be both direct through habitat loss and indirect through changes in prey abundance and distribution (i.e., availability) and food chain dynamics, with changes in top predator communities (particularly marine mammals and birds). Other expected changes are modifications in ocean circulation, pH balance, sea level and ice cover qualities, as well as unpredictable weather effects and increased human activities (e.g., IPCC 2007), which will also affect food chain dynamics. The serious consequences of climate change for marine mammals can already be seen in the decreasing blubber thickness of harp seals and minke whales in the Barents Sea (Bogstad *et al.* 2015), and the changes in geographical distribution of minke and fin whales around Iceland (Víkingson *et al.* 2015).

4.2 UNCONTROLLED DIRECT REMOVALS

A prerequisite for reliable and responsible resource management is to have reliable estimates of anthropogenic removals, i.e., estimates of the non-natural mortality due to human activities, either

[30] ICIA: Arctic Climate Impact Assessment
[31] IPCC: Intergovernmental Panel on Climate Change of the United Nations
[32] United Nation Environment Programme
[33]https://www.newsdeeply.com/arctic/articles/2016/08/31/subsistence-hunting-in-alaska-in-an-age-of-climate-change

direct or indirect, so it can, be included in population modelling. The direct non-natural mortality includes direct takes, as well as animals which are struck but lost by hunters. It also includes those animals which are by-caught in fishing gear (dead or alive but injured), those which died because of ship strikes, and any animals taken into captivity. Indeed, from the standpoint of population dynamics and management, there is no intrinsic difference between by-catch, ship strikes and whaling/sealing. All three permanently remove animals from the population. To fully understand the impact of these interactions, it is therefore necessary to have mechanisms not only for monitoring population abundance and trends and harvest reporting (including e.g., reliable struck and lost data), but also to obtain reliable estimates of by-catch and ship strikes for species and areas where these might be an issue. Indeed, all non-natural mortalities - direct catch, by-catch and ship strikes - should ideally be taken into account when estimating allowable catch levels.

4.2.1 Ship strikes

Except in the case of some specific species and areas, ship strikes are at present mostly seen as a welfare problem rather than a population-level issue, and do not appear yet to be a significant problem in NAMMCO countries. Development of shipping activities in pristine areas of the Arctic may, however, change this and ship strike related mortalities in some areas may be equivalent or larger than the hunting quotas (NAMMCO 2016b, page 48: Comments). These removals must also be included in population modelling and ship-strike related mortality needs therefore to be monitored and estimated.

4.2.2 By-catch and entanglement

Mortality due to by-catch and entanglement has long been recognised as having significant demographic effects on many populations of marine mammals and as a factor reducing or limiting the recovery of marine mammal population (e.g., Reeves *et al.* 2013). The global annual by-catch of marine mammals was estimated to be over half a million animals, with roughly an equal number of cetaceans and pinnipeds (Read *et al.* 2006). The World Conservation Union (IUCN) recognizes by-catch in fishing gear as one of the greatest threats to the survival of cetacean populations and the single-largest cause of mortality for small cetaceans[34]. ASCOBANS recognises by-catch as the most serious threat to cetacean populations in Europeans waters[35].

In recognition of this, NAMMCO is convening an expert Working Group on By-catch, which should a) *Identify all fisheries with potential by-catch of marine mammals, b) Review and evaluate current by-catch estimates for marine mammals in NAMMCO countries, c) If necessary, provide advice on improved data collection and estimation methods to obtain best estimates of total by-catch over time.* The most problematic species with regard to by-catch in NAMMCO countries are likely harbour porpoises and grey and harbour seals, although an overall assessment of the extent of the risk is needed. Entanglements of large whales, for example, seem to be increasing, and the impact of this needs to be assessed.

4.3 INSIDIOUS *UNDERCOVER* ANTHROPOGENIC STRESSORS

Although many stocks of marine mammals have recovered or are recovering from overexploitation, marine mammal resources face considerable challenges and global pressures (e.g., Clapham 2016). Stressors on the marine environment, such as habitat loss, climate change, ocean acidification and invasive alien species, all of which impact the health, productivity and resilience of marine ecosystems, represent considerable challenges. In the sections below, we look in more detail at the potential impacts of two categories of insidious stressors: marine pollution and disturbances.

[34] https://portals.iucn.org/library/efiles/edocs/2003-009.pdf
[35] http://www.ascobans.org/fr/species/threats/bycatch. 31/08/2016.

4.3.1 The *soft* killers: contaminants and microplastics

In addition to their direct toxicity, anthropogenic contaminants may affect the resilience of marine mammals and increase their susceptibility to disease, as well as directly affect their reproductive capabilities. Pollution by PCBs (polychlorinated biphenyls) continues to have an impact on populations of marine top predators in European waters long after their production and use were banned in Europe in the mid-1980s. Reproductive failure observed today in harbour porpoise, killer whale and bottlenose dolphin populations are correlated to their PCBs burdens (Murphy *et al.* 2015, Jepson *et al.* 2016, Jepson and Law 2016). Small or declining populations of bottlenose dolphins and killer whales in the NE Atlantic are associated with low recruitment, consistent with this PCB-induced reproductive toxicity (Jepson *et al.* 2016, Jepson and Law 2016). Despite regulations and mitigation measures to reduce PCB pollution, their biomagnification and persistence in marine food webs continues to cause severe impacts among cetacean top predators in European seas.

But persistent organic pollutants (POPs) including PCBs are not static, and they do not remain close to their sources. They transfer over long distances from industrialized to non-industrialized regions, mainly through cycles of atmospheric volatilization and condensation, including to the Arctic, where they concentrate as they make their way up the food chain. The general perception of the Arctic region has long been that its distance from industrial centres keeps it pristine and clear from the impact of pollution. But remoteness and the absence of indigenous pollution sources no longer guarantee the well-being of northern communities and the viability of wildlife populations. Through the process known as transboundary pollution, the Arctic is the recipient of contaminants whose sources are thousands of miles away. The problem is compounded by the fact that many such chemicals are fat-soluble, and the Arctic has a relatively high-fat food web.

These contaminants can have serious effects. In Svalbard in recent years, 1.5% of sampled polar bear females have been observed with partially developed male sexual organs. These animals are termed pseudohermaphrodites and are thought to be the result of long-range pollutants (e.g., Wiig *et al.* 1998). Clearly, such effects need to be monitored and taken into account in population modelling. Marine POP pollution undermines food quality, sometimes leading to levels in seafoods above accepted standards for human consumption. For example, the high level of accumulation of environmental contaminants in the Arctic food web has led the Health Authorities in the Faroes[36] and Greenland[37] to recommend a reduced intake of marine mammal meat and a 0-intake for some specific groups. It is important to note that these contaminants are not manufactured or used in the Arctic but originate from industrial regions far from the Arctic.

Microplastics are now turning up in all the world's major oceans, including the Arctic and Antarctic, and are likely the most numerically abundant items of plastic debris in the ocean today. They include larger plastic items that have been degraded down in size as well as tiny plastic "micro-beads" used as exfoliants in soaps, creams, and other products. Quantities of these plastics in the oceans will inevitably increase, at least as long as the release of plastics to the environment continues, in part because large, single plastic items ultimately degrade into millions of microplastic pieces. Microplastics are easily ingested by fish, shellfish and other sea animals including marine mammals. In addition to the physical damage done by any plastic itself, microplastic beads accumulate harmful chemical contaminants and transfer them to the animals that ingest the plastic. (e.g., Law and Thompson 2014, GESAMP 2015). "*Major questions remain about the risks from microplastics to marine organisms and ecosystems as well as to food safety and public health*" (Law and Thompson 2014).

4.3.2 Anthropogenic disturbances

Human activities, such as oil and gas exploration, shipping, fisheries, and tourism generate disturbance to marine mammal populations in various ways through e.g., area occupation, noise, and competition

[36] Faroese Food and Veterinary Authority 2011, http://www.whaling.fo/media/1043/hfs-uk_0.pdf
[37] Grønlands Ernæringsråd 2007, http://old.paarisa.gl/media/9795/contaminant_pjece_dk_pdf.pdf

for resources (NAMMCO 201/6c). Close approach by whale and seal watchers may result in modified behaviour, particularly in breeding and nursery areas, and can negatively affect small, localised populations (Bejder *et al.* 2006). Direct collisions between whale watching vessels and cetaceans also occur[38], with the possibility of serious injuries. These disturbances impact marine mammals not only at the individual level (welfare issue), but also at the population level. They can result for example in displacement from preferred habitat (for migration, foraging, resting, etc.), habitat disruption or destruction, and disruption of breeding/moulting/haulout areas (particularly for seals and walrus). Also, whereas an individual stressor may not necessarily represent a significant threat, the cumulative impacts of different stressors may represent a considerable risk to the species. The impact of such threats needs to be addressed (Higham *et al.* 2014).

A consequential effect of sea ice reduction coincidental to climate change is the increase in human presence and activities in the Arctic, including oil, gas and mineral development, shipping, fishing, and tourism in various areas. These activities will have secondary risks such as chemical and noise pollution (Reeves *et al.* 2014). These impacts will occur in areas that were previously (considered) "pristine" and are also essential to marine mammals. The cumulative and synergistic effects of these multiple stressors, likely associated with additional competition as temperate species move northward, may become significant challenges for some species, especially those who are ice dependent. The increase in activities seen in recent years will likely continue with the continued reductions in sea ice extent. The effect of these anthropogenic activities and disturbances needs to be assessed and predicted, so their impact can be included in population dynamic models and management. One of the major difficulties and concerns with such assessments is that impact studies are usually conducted specifically for each project, not considering the cumulative effect of different projects on specific areas or marine mammal stocks. There is no umbrella overview of consequences, especially when several countries are involved. Indeed, a typical sentence in impact assessment reports is "No populations of flora or fauna are unique to the Project area". Different projects can for example generate shipping through the same waters important to marine mammals - which have been until now pristine. Examples of such projects of concern for marine mammals are the Canadian large-scale iron-ore Mary River Project[39] on Baffin Island, Nunavut, and the Greenlandic Citronen Base Metal Project[40] in Peary Land in North Greenland, both generating shipping going through the Northeast and Northwest Water polynyas, areas very important to marine mammals. One problem with such projects is that they may change somewhat in essence (e.g., plans and shipping intensity) after the license has been granted. The Mary River Project, for example, did change the shipping point and increased the yearly shipping period from 3 months to ten.

4.4 PRECAUTIONARY MANAGEMENT NEEDED AND AN APPEAL TO JOIN FORCES

Therefore, aware that direct catches represent only a visible anthropogenic pressure and that marine mammals face multiple, cumulative and synergistic threats, NAMMCO countries reiterate their will to progress towards a precautionary and effective ecosystem-based management and the monitoring of all direct or indirect anthropogenic threats and disturbances, such as by-catch and entanglements, noise, pollution, climate change and increased human activities (NAMMCO 2016b).

With certain but complex and somewhat unpredictable environment changes as backdrop, and their unforeseeable consequences for marine mammals and thereby the coastal communities using these resources, NAMMCO finds it essential to increase the scientific cooperation between all organisations dealing with marine mammal conservation (NAMMCO 2016b). NAMMCO therefore aims at strengthening its cooperation with the Arctic Council, the International Council for the Exploration of the Sea (ICES), the International Whaling Commission (IWC), The Convention for the Protection of the

[38] One recent collision example: http://www.cbc.ca/news/canada/montreal/whale-boat-collision-1.3740714
[39] http://www.baffinland.com/the-project/location-and-project-history/?lang=en
[40]http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2015/Ironbark_SIA_EIA_NSI/Documents/4%20Citronen%20EIA%20Ikke-teknisk%20resume_ENG.pdf

Marine Environment of the North-East Atlantic (OSPAR), the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) and any other international instrument which may require the advice of NAMMCO, for the benefit of marine mammal conservation for current and future generations. It is essential to underpin the key elements that will strengthen the resilience of Arctic and northern communities and enable them to survive and thrive in a world of uncertainty. Among these elements, food security is a prerequisite.

5. Marine Mammals, a Healthy Resource with Challenges

5.1 Nutritive value

The nutritional value of marine mammal meat places it on the top among seafood products and superior to meat from livestock animals (Anon. 2003-2004). The meat is especially rich in protein, essential amino acids and mineral nutrients like iodine, potassium, selenium, magnesium, zinc, phosphorus and calcium. Marine mammals are a good source of vitamins A, B, D and E. The high level of antioxidants found in whale blubber makes it the most important source of vitamin C in the Arctic (Baines *et al*. 2015). Whale *mattak* (skin) is a rich source of vitamin A and C, thiamine, riboflavin and niacin as well as being a major source of antioxidants and selenium (Government of Greenland 2012). The meat is characterised by being low in saturated fats, rich in healthy long-chain monounsaturated fatty acids, LC-MUFA, and *n-3* long-chain polyunsaturated fatty acids, LC-PUFA (omega-3 fatty acids).

5.2 Health benefits

A substantial number of health benefits are linked to the intake of seafood and marine mammal products. Since the 1970s it has been documented that the traditional Inuit diet, consisting mainly of marine mammals (meat and blubber), relatively little fish, some game meat (reindeer, muskox, birds) and local berries, has prevented the effects of lifestyle diseases raging in the Western world and which are major causes of death, such as cardiovascular disease, thrombosis and atherosclerosis (Mulvad *et al.* 1996). It may also be an important protective factor against prostate cancer (Dewailly *et al.* 2003). Regular intake of seal and whale products gives a lung functionality compatible with the level achieved when consuming daily vegetables and fruits (Baines *et al*. 2015). Subsistence living requires exercise and hard physical work, which also protect against western societal diseases.

The vitamins A and C, thiamine, riboflavin, and niacin contained in whale mattak provide protection against scurvy (Government of Greenland 2012), its antioxidants keep the arteries healthy, and its selenium contributes to the antioxidation process and may provide some protection against the potential harmful effects of mercury and other heavy metals (e.g., Freeman *et al.* 1998, Mulvad *et al.* 1996).

The beneficial properties of marine mammal products could be connected to their unique fatty acid composition and their high levels of omega-3 fatty acids but may also be related to antioxidants and other substances found in the oils. Oils from marine mammals may have advantages over fish oils (NAMMCO 2007, Anon 2008-2009, Valdersnes *et al.* 2013), with polyunsaturated fatty acids (PUFAs) from seal blubber oil being more effectively absorbed by the body than those from fish oil (Anon. 2011a). Marine mammal oils have potentially beneficial effects on several diseases and symptoms, such as reducing general and specific pain, reducing symptoms in food hypersensitivity, reducing the reactivity of blood cells and the activation of coagulation. They may also have beneficial effects on some skin diseases (NAMMCO 2007). There is also a positive effect on the prevention of immune and inflammatory diseases. The intake of food rich in n-3 PUFA during pregnancy may decrease the risk of allergic diseases in the offspring, prolong pregnancy and reduce the risk of pre-term birth (Anon. 2011a).

Balenin (an imidazole dipeptide), found in high quantities in whale bones and muscle, has beneficial health-related effects as an antioxidant. It may also hasten the recovery process of fatigue induced by physical load and daily activities in humans, as well as having a positive effect on memory loss and learning ability with ageing, indicating a possible preventive effect against dementia (NIFES 2013, Sugino *et al.* 2013).

5.3 HEALTH CONCERNS: CONTAMINANTS

In 2011 and 2012 the Norwegian Scientific Committee for Food Security carried out a risk assessment to identify possible risks associated with human consumption of products from seals (Anon. 2011b) and whales (Anon. 2011b, Valdersnes *et al.* 2013). The panel was unable to document that consumption of seal and whale meat was associated with a risk of exposure to human pathogens. Firm conclusions could not be drawn as the documentation was limited, but it was emphasised that slaughter hygiene was very important, and that a more systematic meat control practice should be established (Anon. 2011b, Valdersnes *et al.* 2013).

Whales and seals are long-lived species and as top predators they are exposed to high levels of environmental persistent organic pollutants, (POPs), and heavy metals which accumulate along the food chain. Whales and seals feeding at higher trophic levels are by default expected to contain higher levels of contaminants than species feeding at lower levels, such as krill-eating species. Killer whales, walrus and polar bears are thus expected to have, and do have, higher POP levels than fin and blue whales and crabeater seals. The accumulation of pollutants in different organs varies within each animal. The geographical area where the stock is feeding also influences the accumulation rate of contaminants due to the large geographic variability in contaminant levels, both natural and anthropogenic (Sanderson and Gabrielsen 1996, Hansen *et al.* 2008, Anon. 2014).

Methyl-mercury is known to adversely affect the development of the nervous and immune systems (e.g., Hansen *et al.* 2008). Adults who are exposed to methyl-mercury are also more prone to developing Parkinson's disease. Although a high content of methyl-mercury can be found in both whale and seal meat, blubber and oil, these are also rich in selenium, which has in marine mammals the effect of counteracting methyl-mercury damage. The toxic effects of diets polluted with methyl-mercury but also high in selenium are likely decreased (Anon. 2011a).

In 2011, meat from 84 minke whales (which are mostly krill eaters) taken in the Barents Sea were analysed for mercury, methylmercury, cadmium, lead and total arsenic. In addition, some samples were analysed for polybrominated diphenyl ethers (PBDEs) and perfluorinated compounds (PFCs) (NIFES 2012). None of the samples showed concentrations of mercury above 0.5 mg / kg wet weight (EU and Norway's maximum level for mercury in fish muscle) and the average mercury concentration was 0.15 mg/kg. Likewise, the levels of all the other contaminants were low. Based on these results, the Norwegian Food Safety Authority in 2012 revoked its warning about pregnant and lactating women eating whale meat. Analysis of meat for pollutants in Icelandic fin and minke whales (both baleen whales feeding at low trophic levels) have also shown levels well below residue limits stipulated for food[41].

In contrast, Northeast Atlantic pilot whales (which feed at a higher trophic level) recently sampled in the Faroe Islands contain contaminants (both organochlorines and metals) in concentrations such that neither meat nor blubber comply with current limits for acceptable concentrations of toxic contaminants. Although Faroe islanders have long relied on pilot whales as a local and important wildlife food resource, the consumption of pilot whale meat today represents a hazard to the health of consumers (e.g., Weihe and Joensen 2012, Grandjean *et al.* 2011). Since 2011, the advice from the Faroese Food and Veterinary Authority is as follows: adults should eat at most one meal of pilot whale

[41] https://eng.atvinnuvegaraduneyti.is/subjects/sustainable-whaling/questions-and-answers/

meat and blubber per month; girls and women should refrain from eating blubber if they were planning a pregnancy within the next three months, were pregnant or were breastfeeding and preferably until they had the number of children they want; pilot whale kidneys and liver should not be consumed.

The exposure level of organochlorines found in marine mammals from Greenland is a matter of concern due to their potential role in carcinogenesis, their immunotoxin properties and their suggested properties as xenoestrogens (Mulvad *et al.* 1996). In Greenland, the Nutrition Council[42] also recommends that women restrain from consuming marine mammals until they have had the number of children they want. They also recommended that pregnant and lactating women, and small and young children do not eat toothed whales, polar bears, seabirds, and old seals (Government of Greenland 2012).

6. Marine Mammals, a Resource Contributing to Food Security

6.1 Food security – a growing concern

A growing number of fora have raised concerns regarding food security considering the many changes affecting the world's ecosystems brought about by climate change and by industrialisation and conflicts. Food security – or rather food insecurity – is recognised as one of the major risks of the 21st century and a major area for international concern and response (WEF[43] 2008, 2012, 2016).

"*Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (Word Food Summit 1996). Food insecurity is the converse. It is an outcome of inadequate or uncertain access to an acceptable amount and quality of healthy food.

The four main pillars of food security are identified as (1) *availability, (2) access, (3) utilisation and (4) stability* (FAO 2009[44]). Food availability refers to sufficient quantities of food available on a consistent basis, food access refers to the physical, economic and social access to food and food utilisation refers to nutritional diversity and food safety issues. Food stability refers to the maintenance of the three first dimensions over time (seasonally and over the years).

The right to adequate food and thereby food security, generally understood as the right to feed oneself in dignity, is a long-standing international human right most countries have committed to. The current definition of food security covers a broad concept, emphasizing the importance of nutrition but also referring directly to food preferences, underlining that *preferences* are an important factor - and an acceptable aspect - in striving for food security.

Although food security is often defined in economic (e.g., FAO 1995[45]) and dietary terms, there are clearly other important non-economic considerations that influence food security outcomes. Indeed, the very notion of what constitutes a food resource is itself a cultural construct (Freeman 2001). In the final Declaration and Action Plan, the 1995 Kyoto conference on Fisheries and Food Security calls for *"...an increase in the respect and understanding of social, economic and cultural differences among States and regions in the use of living aquatic resources, especially cultural diversity in dietary habits…".*

Food security, and the rights to manage its own resources and not be deprived of them is also a right enshrined in Indigenous Peoples' specific rights, as described in more detailed in Appendix 5.

[42] Grønlands Ernæringsråd 2007, http://old.paarisa.gl/media/9795/contaminant_pjece_dk_pdf.pdf
[43] World Economic Forum, Geneva. Global Risks Reports, 2008, 2012 and 2016.
[44] FAO [Food and Agriculture Organisation of the United Nations] 2009, World Summit on Food security.
[45] FAO 1995. The state of food and agriculture. http://www.fao.org/docrep/017/v6800e/v6800e.pdf

6.2 THE STATUS OF FOOD SECURITY IN THE ARCTIC

In the Arctic, food insecurity is particularly exacerbated by the changes incurred by climate change, and its many impacts have become a central concern (e.g., Goldhar *et al.* 2010, Ford and Goldhar 2012, ICC[46] 2012, Papatsie *et al.* 2013, CCA[47] 2014, MacDonald *et al.* 2015). Food security is linked to a range of driving factors including geography, contamination of country foods, impacts of climate change and economic vulnerability (ICC 2012). Populations in northern Canada and Greenland face similar challenges related to contamination and a reduction of country foods in the diet and high dependence on imported products at prohibitive cost. The increased dependence in these regions on flown-in food of low nutritional quality contributes to health problems such as obesity, heart disease and diabetes.

UNEP (2007) considers *'health and nutritional concerns (related to the availability of country food) associated with changes in the abundance and migratory patterns of subsistence resources'* among the most significant consequential effect of changes in snow and ice patterns. For communities used to a traditional subsistence way of life, unpredictable weather effects (changing ice freezing patterns, rising temperature, more frequent and intense storms and blizzards) are making it increasingly difficult to adapt. Climate change directly alters both animal migration routes and hunters' access possibilities, making hunting harder. Climate change also causes delayed food shipments and a global rise in food prices (e.g., FAO 2016), which further impact Inuit access to affordable and nutritious foods (e.g., ICC 2012).

Access to adequate food has been identified as a major challenge in the Canadian Arctic, particularly for Inuit communities, where levels of food insecurity are consistently higher compared to southern Canada (Huet *et al.* 2012, ITK[48] and ICC 2012, CCA 2014). Despite the fact that Canada is a G8 country that often tops rankings in the UN Human Development Index, 1.3 million households were food insecure in 2014 (Tarasuk et al 2016). In Nunavut, household food insecurity rates are six to eight times higher than the national average (Rosol *et al.* 2011, Pardilla *et al.* 2013), with a prevalence of 69% in adults as reported by the Inuit Health Survey. In Inuvialuit and Nunatsiavut rates are five times higher. The Nunavut Inuit Child Health Survey found that nearly 70% of Inuit preschoolers resided in food insecure households and 56% were in households with child food insecurity (Egeland *et al.* 2010, Fig. 3). In 2012, four million Canadians—including more than a million children—experienced some level of food insecurity. The 2013 report "*Hunger in Nunavut – Local food for healthier communities*"[49] reports that 75% of Nunavut household homes without an active hunter in the family were food insecure.

In Greenland, preliminary studies indicate relatively secure food systems in communities of comparable size to those in Nunavut, albeit with significant differences between different target groups and with emerging stresses in light of climatic and socio-economic change (Goldhar *et al.* 2010, Ford and Goldhar 2012, MacDonald *et al.* 2015). A 2010 survey (Niclassen *et al.* 2013ab) showed that children living in villages and children from homes with a low family affluence were experiencing increased risk of food insecurity, with the associated negative health and cognition effects. In 2006 and 2010 in Greenland, 17 % of 11-17 years old schoolchildren were reported to go to school or to bed hungry "always" or "often" due to lack of food in the home while 19% experienced it "sometimes" (Niclasen *et al.* 2013a, 2015). Noteworthy and worryingly, the youngest children reported more frequently having experienced food insecurity, while previous studies had found that younger children generally were protected at much greater levels of food insecurity than were older teenaged children. New information indicates that small communities and settlements in west northern and east Greenland experience food insecurity as a growing problem, partly due to restrictions in hunting rights (Jessen pers. com.).

[46] ICC, Inuit Circumpolar Council
[47] CCA, Council of Canadian Academies
[48] ITK, Inuit Tapiriit Kanatami
[49] http://www.actioncanada.ca/wp-content/uploads/2014/04/TF-3-Hunger-in-Nunavut-EN.pdf

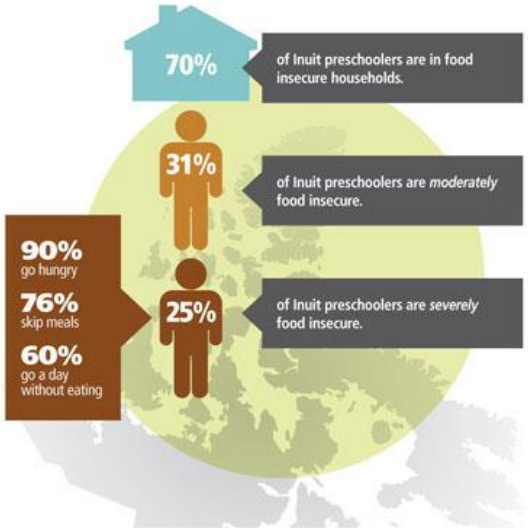


Figure 3. *Nunavut Inuit Child Health Survey, 2007–2008 (Egeland et al. in CCA 2014)*

6.3 MARINE MAMMALS AS CONTRIBUTORS TO FOOD SECURITY?

Focussing on the Atlantic Arctic regions, the following sections examine whether marine mammals meet the four criteria (*availability*, *access, utilisation* and *stability – referring to the three other criteria*) qualifying them as valuable contributors to food security.

6.3.1 Stable availability

Food availability addresses the "supply side" of food security and in the case of marine mammals is determined by the stock's abundance. Are marine mammal stocks generally depleted or are there some "healthy" stocks available to Northern coastal residents?

Many of the stocks depleted by overexploitation from commercial whaling and sealing are presently in the process of recovering and some have recovered (e.g., IWC 2016[50], Smith *et al. in* UN 2016; Clapham 2016). Indeed, some stocks, such as fin whales in the North Atlantic, are likely above their pre-exploitation level (Víkingsson *et al.* 2015). One reason for this is improved awareness and management. These *healthy* stocks represent renewable, abundant, and locally accessible food resources in different parts of the world, which can contribute to reinforcing food security – if sustainably managed to ensure stable availability.

A compulsory quality for a resource to be a valuable contribution to food security is stable availability, which requires sound and effective management to ensure sustainability, i.e., using resources at rates that do not exceed the capacity of Earth to replace them. A precautionary, sound, scientific-based management system embedded in an ecosystem perspective ensures the sustainability of human activities and therefore the stability of marine mammal resources.

Arctic resources, both animal and plant, are characterised by marked seasonal variations. A flexible, multispecies approach to resource use accommodates this seasonal availability. Arctic diets vary with season, with, for example, different species of marine mammals being exploited at different times of the year. Caulfied (1997) attributes the Inuit survival to this flexible, multispecies approach to resource use; when a valued specific resource is not available due to environmental changes (seasonal or periodical), Inuit shift to other resources. Overall, marine mammals are available all year-round.

[50] Background information on the status of whales, International Whaling Commission. September 2015. https://iwc.int/status

6.3.2 Stable access

The second dimension of food security is *access*, referring to the physical, economic, and social access to food. Accessibility and availability of food are the most important aspects of food security. An adequate supply of a resource at the local level does not in itself guarantee food security at the household level. There are many factors that influence the accessibility of food choices.

One element in some of the northern communities was the practice of helping each other in acquiring food and sharing food resources, i.e., making accessible to the community resources unavailable to single individuals and also making resources accessible to persons who would not have had access otherwise. Community-based hunts such as pilot whaling, collective minke whaling, and bowhead hunting are good examples of this collective resource gathering.

Inuit culture is particularly known for the practice of food sharing, a form of food distribution where one person catches the food and shares it with the entire community. Searles (2002) describes the Inuit perspective on food by saying that "*in the Inuit world of goods, foods as well as other objects associated with hunting, fishing, and gathering are more or less communal property, belonging not to individuals but to a larger group, which can include multiple households*." Food in an Inuit household is not meant to be saved for the family who has hunted, fished, gathered, or purchased it, but instead for anyone who needs it. Elders and single mothers with young children especially benefit from this tradition.

Pilot whaling in the Faroes is also a good example of cultural food-sharing, where whale meat and blubber are, still today, shared freely and as equitably as possible between the participants in the drive. The distribution is based on solidarity and has its roots all the way back to the earliest pilot whale hunts. Depending on the size of the catch, the people who live in the area but have not participated in the hunt typically also receive a share, independent of their age and sex. On two islands, Sandoy and Suðuroy, the catch is automatically distributed equally among all residents and not just between those who participate in the hunt.

Such communal food practices increase the general accessibility to marine mammal resources. Other factors, however, some due to climate change, may limit this accessibility. In Greenland, the high costs of hunting equipment—boats, snowmobiles, rifles, sleds, camping gear— and transportation (oil and fuel) is causing a decline in the number of families who hunt for their meals, as low-income families cannot afford the equipment when they also have to deal with the high cost of essential commodities. This is in a large part due to the EU ban on sealskins, which has reduced or in some cases, eliminated the revenues from the sale of sealskins, a by-product of the hunt. This particularly affects families of low income in remote communities where there are few job opportunities. With reduced hunting, young people do not develop the skills to survive off their land and there is increasingly a lack of knowledgeable hunters and fishers. Food security may be negatively affected by the loss of traditional hunting practices.

Climate change also affects food access. Changes in sea ice extent and ice freezing patterns leads to changing animal migration patterns and local decreases in marine mammal populations. This also makes hunting less accessible and riskier because of thinner ice, and sometimes prevents access to usual hunting grounds, thus reducing accessibility. In the past, when a valued resource was not available due to environmental changes, Inuit shifted to another resource. However, restriction in hunting rights and quotas constrains the ability of Arctic peoples in switching to alternate resources, limiting the overall access to marine mammal and alternative resources.

6.3.3 Stable utilisation

In the definition of food security, utilisation refers to food safety issues. Human consumers are top predators at high risk of bioaccumulation of pollutants and the contamination of marine mammals is of high relevance to food security. As described earlier (see section 4), there are health benefits related

to the consumption of marine mammal products, but there are also risks associated with environmental pollutants. These risks depend on the species, the area the animals are from, and the organs consumed.

Contaminant risks in Arctic communities need, however, to be considered in the light of benefits in a risk management approach. Benefits include socio-cultural cohesion, self-sufficiency, and self-determination, as well as nutrient benefits. The trade-off balance between benefits and risks depends not only on the nutritional value and health benefits/risks of a specific resource, but also on the nutritional value and health benefits/risks associated with alternative resources. POPs have potential negative effects on children's neuro-physiological, hormonal, and immune system development (e.g., Hansen *et al.* 2008). On the other hand, food insecurity has adverse health effects on Canadian and Greenlandic school children, particularly younger ones (e.g., Egeland *et al.* 2010, 2011, Niclasen *et al.* 2013a). Among the good reasons for native people to maintain their traditional ways of acquiring food (with the outdoor life and exercise it requires) and eating, as far as is possible today, is that it provides a hedge against obesity, type 2 diabetes, and heart disease, diseases that *westernised* flown-in food tends to facilitate. In Greenland, although the Nutrition Council recommends that some sections of the population reduce their intake of marine mammal products, it recommends at the same time to not stop eating traditional foods because the effects of stopping are not known, and it is believed that a reduction in the traditional diet would lead to an increase in the consumption of low-quality flown-in food and consequently in the number of "western" diseases (Government of Greenland 2012).

When exactly risks outweigh benefits is an area of discourse that has and will continue to be a source of debate and contention (Egeland *in* Anon 2011a). Continued research is needed, especially on the interaction between nutrients and contaminants in order to better describe the potential risk associated with northern diets. The lack of data currently prevents any clear-cut recommendations on the risks and benefits of consuming food products from whales and seals (Anon. 2011a). Consumers have to be made aware of the risks and benefits of diet choice, so they can make an informed personal decision. Patricia Cochran, the Executive Director of the Alaska Native Science Commission says "*We can help communities make informed food choices. A young woman of childbearing age may choose not to eat certain organ meats that concentrate contaminants. As individuals, we do have options. And eating our salmon and our seal is still a heck of a better option than pulling something processed that's full of additives off a store shelf*."[51] For at least some Inuit, the value of eating the foods of their ancestors is worth the cost. "*Contaminants do not affect our soul, avoiding our foods from fear does*." (Egede *in* Cone 2005*).* Clearly the monitoring of the level of contamination of different marine mammal products must be prioritised, so that the information and advice provided to the population is complete and current and can form the basis of an informed choice.

7. Marine Mammals, a Source of Identity and Empowerment

The traditional ways of acquiring, preparing, and storing food are, in the north as elsewhere, moulded by the surrounding possibilities and realities. They are such an integral part of cultural identity that they have survived from the days of the first peoples to inhabit the north. Northern diets and food traditions are unique and have been shaped by weather and the centuries-long struggle for survival in a harsh environment. The remote and isolated communities of the barren North, with limited communication and transport possibilities, have wrought cultures intimate with their natural surroundings based on the skill and knowledge required to make the best use of the limited local resources. Northern diets were a way of life, of survival, in places too cold for any substantial agriculture, where food - whether hunted, fished, or gathered - could not be taken for granted.

[51] http://discovermagazine.com/2004/oct/inuit-paradox

Marine mammals have been highly prized resources since prehistoric times and subsistence whaling by indigenous people in the Arctic goes back millennia. Archaeological excavations in Disko Bay in West Greenland dating from 4,500 years ago reveals that 60% of the bones found in middens belong to marine mammals. This show that Greenlandic ancestors depended on whales and seals for their survival (e.g., Grønnow and Meldgaard 1988, Seersholm *et al.* 2016). Scandinavian petroglyphs (rock carvings)[52] from about 4,000 years ago depict whales, seals and whaling scenes. Since then, the hunting of marine mammals has been central to the livelihoods of northern communities. Marine mammals have represented critical – survival - resources for many coastal communities, as food, fur, and leather. Their high cultural and spiritual significance is testified by their appearance in ancient myths, legends, literature, and art of different kinds.

One of the best examples of the vital significance of marine mammals and of the importance of sharing them is likely found in the Faroese "Sheep Letter" from 1298, the oldest surviving Faroese legal document. The Letter describes the rights to both stranded whales and whales driven ashore and outlines the rules for sharing them. This resource was so valuable that the catch data have been partly recorded since 1584 and continuously since 1709, which represents the longest catch statistics series existing for any wild animal harvest in the world. These documents were initially kept in the church books, another sign of their importance.

Nowadays, in this time of social benefits, hunting (including whaling and sealing), fishing and gathering do not mean survival as such, but remain enshrined in everyday life of northern communities – as a cultural tradition, as a complement to the household economy and as a contribution to individual economic independency and empowerment. People coming from southern areas are, for example, surprised by the decreasing number of fish stores that can be found the further north you go although families regularly consume fish. But, why would you have many fish stores when so many families fish for themselves?

7.1 A RESOURCE ENTWINED WITH IDENTITY: FAROES

Faroese people have a very close relationship with nature and treasure the quality of life and community bonds that this connection maintains. The cultural connection to traditional local food remains strong (Fielding 2011), and most of the ancient hunting traditions are kept alive. Faroese people from all walks of life keep sheep, hunt birds, fish and participate in whale hunts in their spare time. These modern-day, traditional forms of food production are a welcome contribution to the household economy. In 2002, pilot whaling supplied 30% of all locally produced meat (Anonymous 2002).

Archaeological digs show that pilot whales have been a staple part of the Faroese diet since the Viking age (Sanderson 1992). Pilot whale hunting, *Grindadráp*, has occurred throughout the Norse history of the Faroes, with written descriptions of it from as early as 1587 (Sanderson 1994). It was always regulated, as evidenced by the Sheep Letter from 1298 which outlined rules for the use of whales. Dedicated regulations for pilot whaling were enacted in 1832 and were most recently updated in 2013[53]. Today, as in times past, the whale drive is a community activity open to all, organised on a community level and regulated by national laws.

Although of less economic significance today, the free sharing of pilot whale meat and blubber from the hunt has contributed to good health and to the survival of many elders, low-income families, and families where men and boys were absent fishing for weeks and months or simply disappeared at sea (Joensen 2009). It is therefore enshrined in the Faroese culture and identity and has long been singled out as a "characteristic feature of Faroese culture" and "an established symbol of Faroese national

[52] https://en.wikipedia.org/wiki/Rock_carvings_in_Central_Norway
[53] http://www.whaling.fo/media/1041/grindakunnger%C3%B0plus2013plusen-1.pdf

identity" (Sanderson 1992). It has inspired the production of extensive cultural material including literature, poetry, painting, sculpture, handicrafts, music and songs. Whaling equipment is often displayed in houses as décor, taking it beyond its mere utilitarian purpose.

Pilot whale killing, S. J. Mikines 1957

Contrary to the situation in Newfoundland, where the pilot whale stock became severely depleted by the commercial hunt which provided whale meat to the province's mink and fox fur farms, pilot whaling in the Faroese is forbidden by law from becoming commercial. The management system is designed to provide food to the residents while not depleting the resource through unnecessary extraction (Fielding 2011).

7.2 A RESOURCE ENTWINED WITH IDENTITY AND SOCIAL PURPOSE: GREENLAND

Inuit cultures have experienced the loss of identity that happens when a culture goes through a rapid and radical societal change, especially when those hunting cultures are at the same time demonized. The new generation feels cut off from the older generation, but not really part of the new trends because of remoteness and limited economic means, among other reasons. Fathers and grandfathers were fierce hunters, skilled at coping with harsh conditions and possessing unique knowledge, knowledge needed and sometimes used by the western-admired great polar explorers. Ignorance of that knowledge had dire consequences. Sir John Franklin, along with two entire ship's crews of 128 men, died in 1847 trying to find the fabled North-West Passage partly because of the refusal to accept that an indigenous people held the key to survival in the Arctic (O'Keeffe 2010[54]). Today, ignorance of that knowledge still has dire consequences, as many members of the younger generation feel cut off from their culture and struggle with their identity. The suicide rate has exploded in Inuit communities in recent decades compared with other countries, with younger men making up the largest proportion of these deaths ([55,56]). Greenland has currently by far the highest suicide rate in the world.

Food serves as an important vehicle in the creation of meaning and identity, a process that has become increasingly important politically, yet increasingly complicated socially and economically as Inuit react to an expanding world of commodities and consumer tastes (Searles 2002). "*How we get our food is intrinsic to our culture. It's how we pass on our values and knowledge to the young*" (Cochran *in* Gadsby

[54]O'Keeffe, A. 2010. Food security in the Arctic. Griffith Review 27. https://griffithreview.com/articles/food-security-in-the-arctic/
[55] Nunavut suicide prevention strategy available at http://www.naho.ca/documents/it/2010-10-26-Nunavut-Suicide-Prevention-Strategy-English.pdf
[56] http://www.npr.org/sections/goatsandsoda/2016/04/21/474847921/the-arctic-suicides-its-not-the-dark-that-kills-you

and Steele 2004[57]). Subsistence is the intertwining of food gathering and the socio-cultural identification of a traditional and unique lifestyle. This linkage between food and culture is inextricable. Traditional knowledge and traditional food systems support both cultural identity and food security. "*Our foods do more than nourish our bodies, they feed our souls. When I eat Inuit foods, I know who I am. I feel the connection to our ocean and to our land, to our people, to our way of life*" (Egede in Cone 2005).

Whales and seals are also social foods, with multiple cultural meanings, including ideas of care, reciprocity, and unity (Sakakibara 2011). Sharing animal food is a basic ethic in Inuit society and instils a feeling of social solidarity. This ethic remains very strong among the Inuit today (Freeman 2005). Sharing mattak has special significance among all Inuit because it is so highly valued by everyone. The norm of sharing is one very important way to show respect to animals, for sharing signifies generosity, which is a virtue and an appropriate use for the gift of food the animal provides (Freeman *et al.* 1998). The distribution and sharing of whale meat within a community assumes reciprocity. It was and is expected that the successful hunters sharing out the result of their hunt would receive compensation later. This was, in the old days, a kind of "mutual insurance" system (Government of Greenland 2012). It ensures that members of the community will always receive food when in need.

Harvested food is much more than simple calories, it has familial, societal, and cultural bonds as well. "*It's part, too, of your development as a person. You share food with your community… So, you get all the physical activity of harvesting your own food, all the social activity of sharing and preparing it, and all the spiritual aspects as well. You certainly don't get all that, do you, when you buy pre-packaged food from a store*" (Cochran *in* Gadsby and Steele 2004[58]).

Disko Bay, Greenland, © F. Ugarte

The importance of food security for *indigenous* peoples is recognised not just from a nutritional perspective but also from the broader socio-cultural perspective. "*Indigenous perceptions of livelihood security are inextricably grounded in their socio-cultural traditions and their special relationship to ancestral territories and resources. Food and its procurement and consumption are often an important part of their culture, as well as of their social, economic and political organization"* (UNHCR 2010[59]).

[57] Patricia Gadsby, Leon Steele: The Inuit paradox. http://discovermagazine.com/2004/oct/inuit-paradox
[58] Ibid
[59] UNHCHR, 2010: The Right to Adequate Food. Fact Sheet No. 34, http://www.ohchr.org/Documents/Publications/FactSheet34en.pdf

Environmental organisations have also started recognising the meaning of subsistence food. WWF Denmark recently produced a report on the Greenlandic seal hunt and the negative impacts that the European Union import bans on seal products have had on the hunters and the sealskin business in Greenland (WWF 2013). Gitte Seeberg, former CEO of WWF Denmark introduced the report as follows: "Today, as in the past, the majority of people in Greenland live in close connection to the sea. They engage in hunting and fishing activities on a regular or daily basis that sustain them and contribute to their income. The traditional way of life of hunting and fishing is thus intertwined with a modern society and economics. But there is more to hunting and fishing than earning money. It is a lifestyle, a culture, a tradition, and it provides local food for the inhabitants in Greenland – hence the seals remain to be an important part of everyday life here." Greenpeace "today unequivocally support the right of Greenlanders and Indigenous Peoples everywhere to their sustainable seal hunt"[60], although it remains completely against the commercial hunting of seals for profit. Jon Burgwald, Greenpeace Arctic Director, recognises that[61] "In fact, Indigenous communities have shown time and again that they understand how to protect the Arctic ecosystem they call home, and their hunting practices have never been a threat to seal or whale populations… The large-scale, commercial hunt is a world away from the traditional practices of Indigenous Peoples in the Arctic. They do not hunt seal pups, and their hunt is conducted with respect for the animal. They hunt because it is a crucial way to sustain themselves and their families in the harsh Arctic environment. We respect their right to continue this tradition. [The hunt] is not just a matter of culture, it is a matter of survival. Many Indigenous communities in the far north rely on seal products for food, warmth and clothing. They sell some of these products so they can sustain their livelihoods and keep their families alive through the harsh Arctic winter".

As a link to a unique identity, subsistence harvest is, besides its subsistence and economic purposes, a critical activity with a social purpose. By providing self-reliance and self-respect, it serves to alleviate cultural discontinuity, and to create, reinforce and maintain cultural and social identity in communities with limited economic possibilities, but inundated with images of globalisation and consumer values. If not demonised, subsistence harvest would underpin the delicate balancing act of living concurrently in two very different cultures.

7.3 A RESOURCE ENTWINED WITH *AVANT-GARDE* CONSERVATION: ICELAND

Whales have been a source of food in Iceland ever since the country was settled in the 9th century. Utilisation of whale resources is part of Iceland's tradition and history, providing an important dietary component throughout the ages. Written sources of Icelandic whaling reach as far back as the 13th Century (Elis 1991). Whaling in Iceland began with spear-drift whaling which was practiced from as early as the 12th century. Throughout history, whales have been harpooned or speared, driven ashore, or gratefully received when they beached themselves. The importance of whales in earlier Iceland is reflected in the Icelandic language: *hvalreki* is the word for "beached whale", while also meaning something good that is unexpectedly yours or at your disposal, a "godsend".

The Icelandic economy has been and is overwhelmingly dependent on the utilisation of living marine resources, and the sustainability of these resources was and is essential for long-term prosperity[62]. Iceland has therefore a long tradition of a precautionary approach to managing marine resources, including whales. It was the first country in the world to take a conservationist approach to whaling, long before any international agreement.

[60]Jon Burgwald blog, February 2014, http://www.greenpeace.org/international/en/news/Blogs/makingwaves/greenland-sustainable-development/blog/48099/

[61] Greenpeace USA website, http://www.greenpeace.org/usa/where-does-greenpeace-stand-on-seal-hunting/

[62] https://eng.atvinnuvegaraduneyti.is/subjects/sustainable-whaling/questions-and-answers/

Icelanders flensing a whale (16th-century manuscript)

Harvesting of whales, based on foreign-owned land stations, was especially heavy around Iceland, leading to a noticeable decline in catch rates between 1901 and 1915 (Fig. 4, NAMMCO 2000). The Icelandic Parliament reacted to the signs of overexploitation and in 1916 declared a complete ban on whaling around Iceland for whales larger than common minke whales, the first whaling moratorium ever.

In 1935, the stocks appeared to have recovered west of Iceland, possibly through both natural population growth and immigration from other areas (NAMMCO 2000). A law declared that whales in Icelandic territorial waters could be hunted by Icelanders. Whaling was, however, not resumed until 1948, except for limited catches from 1935-1939.

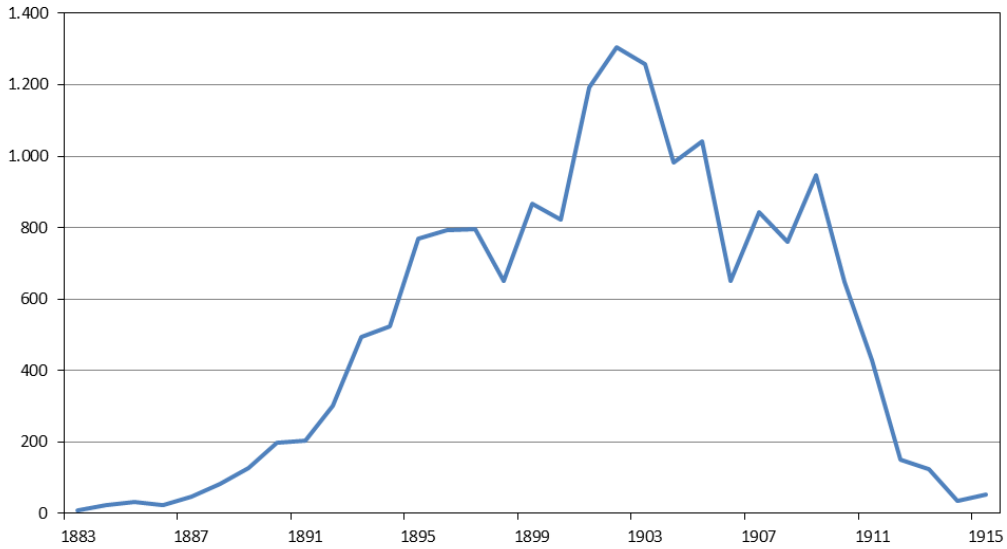


Figure 4. *No. of whales caught by Icelandic waters 1883–1915. Hagskinna 1997.*

Whaling commenced in 1948 with the operations of the Icelandic-owned whaling station at Hvalfjörður and continued until 1989, although from 1986-89 the whaling was only for scientific purposes. Fin whales were the most significant species, but sei whales and sperm whales were also hunted. To begin with, humpback and blue whales were also caught, but in lesser numbers. Hunting of humpback whales was completely prohibited in 1955 and hunting of blue whales in 1960. Strict rules and limitations were applied to whaling in Iceland from 1948 to 1985 when commercial whaling was halted following a decision by the International Whaling Commission (IWC) to suspend commercial whaling due to uncertainty as to the condition of whale stocks.

Commercial whaling of fin and minke whales was again permitted from the autumn of 2006, and has continued since, although there has been no fin whale harvest in some years. Taking 150 fin whales and 150 minke whales would generate an estimated 80-90 man-years of employment (Icelandic Institute of Economic Studies 2010[63]).

7.4 A RESOURCE ENTWINED WITH SMALL COMMUNITIES' VIABILITY: NORWAY

Ancient rock carvings in central and northern Norway portray marine mammals and hunting scenes[64]. Norwegians caught whales off the coast of Tromsø in northern Norway as early as the 9th or 10th century. Vikings from Norway also introduced whaling methods for driving small cetaceans, like pilot whales, into fjords in Iceland. The Norse sagas, and other ancient documents, provide few details on Norwegian whaling, mostly recounting disputes between families over the ownership of whale carcasses, but it is hard to imagine that the hardy Norse seafarers ignored this plentiful source of food and oil while they plied the inhospitable seas of the Northern Atlantic (Elis 1991). Norwegian vessels were whaling from Spitsbergen during the 18th century. New techniques and technologies, developed by Norwegians in the mid-19th century, revolutionized the whaling industry and established Norway's prominence as a whaling nation.

Minke whales have been hunted along the coast of Norway at least since medieval times. Traditional methods were used up until the 1920s, when harpoon guns mounted on ordinary fishing vessels began to be used[65]. Continuing the Norwegian hunting tradition, small communities mostly in northern Norway still hunt minke whales in the idle summer period, as a complement to winter coastal cod fishing. During the winter (January through April) fishermen concentrate on the abundant cod. In the summer, as fish become fewer along the coast, whaling allows boats and their crews to remain employed in areas where job opportunities are limited. Most of the vessels are family businesses, with the owners working onboard and none of the boats are designed exclusively for whaling.

Typical Lofotens' scenery, illustrating the limited arable land area

The majority of today's whalers come from the Lofoten Islands where conditions for agriculture are poor. Fishing has always been the most important source of income there and a third of the population is engaged in the primary production sector (fishing and some sheep raising) (Kalland, in Freeman 2000). Like the Inuit, people of the Lofoten were and still are exploiting generalised niches, switching between several alternative resources, typically being fisher-farmer-whalers. Whaling, unlike fishing,

[63] Institute of Economic Studies of the University of Iceland, 2010. Macroeconomic impact of whaling. Report no. C10 02.
[64] https://en.wikipedia.org/wiki/Rock_carvings_in_Central_Norway
[65]http://www.fisheries.no/ecosystems-and-stocks/marine_stocks/mammals/whales/whaling/#.V7_xRvl97cs

represents a predictable source of income and guarantees the economic viability of many households when other resources that make up their ecological niche cannot be harvested or are subject to low market prices. In this way whaling secures the viability of small communities (Kalland, in Freeman 2000). Like in other small northern communities, whaling supports individual – and communities' - empowerment and self-respect.

7.5 A RESOURCE EMPOWERING SMALL COASTAL COMMUNITIES

Whaling and sealing contribute to supporting a strong, resilient, and sustainable circumpolar region by empowering coastal peoples and communities. Fishing and hunting represent small enterprises, which require (relatively) cheap investment and are thus affordable and accessible to many. They support the existence and the development of a micro-economy, thus strengthening coastal settlements. They promote resource sharing and equitability and provide full or part-time employment in places where possibilities are severely limited, and many survive on social benefits. Food sovereignty—culturally appropriate, locally determined food systems and food distribution—enhance community independence.

Nordic countries have succeeded in maintaining a decentralised pattern of settlements, with small communities scattered along the coast, as the result of deliberate policies. Fishing, sealing, and whaling are among the principal means of livelihood of the northernmost coastal populations. If these coastal communities are to have any future, they are dependent on the acceptance of their right to utilise the living, renewable resources of the sea.

The importance of traditional and local food is acknowledged by many international fora (e.g., FAO 2009), "[we] *Acknowledge the cultural and nutritional importance of traditional and local foods, including from marine living resources in the Arctic*" (Arctic Council 2015[66]). Besides being subsistence activities, grounded in socio-cultural traditions, whaling and sealing also contribute to communities' empowerment and lessen economic dependency. Even if they only represent a negligible factor in the economies of the nations, they are of great significance in the local, regional and, not least, familial economies. Whaling and sealing are part of a larger issue, the right to exploit natural marine resources sustainably, and they symbolise, besides culture and social integrity, the right to self-determination and self-management.

As the Universal Declaration of Human Rights states: "*All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development. All peoples may, for their own ends, freely dispose of their natural wealth and resources… In no case, may a people be deprived of their means of subsistence*"[67].

As mentioned earlier, the rights to manage its own resources and not be deprived of them is also a right enshrined in Indigenous Peoples' specific rights (See in more detailed in Appendix 5).

8. WHALING AND SEALING, PAST AND PRESENT BUT DIFFERENTLY

8.1 TWO DIFFERENT SCALES OF HUNTING PRESSURE

Marine mammals were hunted by coastal people for food and other resources for centuries. Hunting efforts were on a relatively small scale, and the effects were only local and limited. The scale of the

[66] Iqaluit Declaration 2015 by the Ministers representing the 8 Arctic States and the representatives of the 6 Permanent Participant organisations on the occasion of the 9th Ministerial Meeting of the Arctic Council, Iqaluit, Nunavut, Canada, April 2015. http://www.arctic-council.org/index.php/en/document-archive/category/604-declaration-sao-report

[67] Universal Declaration of Human Rights, International Covenant on Civil and Political Rights & International Covenant on Economic, Social and Cultural Rights, 16 December 1966, Part I, Article 1.1 and 1.2.

impact changed with commercial whaling and sealing. These systematic hunts for profit overexploited many whale and seal stocks, especially with the onset of modern whaling and sealing. Some species or stocks become virtually extinct (Steller's Sea Cow, Caribbean monk seal, Southern fur seal, Northeast Atlantic Right whale), while many were heavily depleted, in some cases to 1% of their pristine abundance (e.g., Clapham 2016). Because of this, whaling and sealing are associated with extreme activities: Moby Dick and the obsessive quest of Ahab, the huge Antarctic factory ships processing in a single day more whales than a New England whaler could capture in its five-year voyage, the virtual extinction of Southern fur seals by the mid-1800s, the vast waste of resources with oil and fur as the only important products and meat a by-product if not just discarded. One associates commercial and industrial whaling and sealing with greed, excess and mismanagement – and rightfully so, as commercial whaling and sealing were indeed a blueprint for repeated over-exploitation. However, this was the reality of the past, of the last centuries. This was the reality of aggressive competitive whaling and sealing not adhering to any management regime, the reality of an endless demand for profit, and of moving from one resource to the next one when the first was depleted. This was, however, only part of the story.

Parallel to these huge hunts, subsistence/sustenance and coastal whaling and sealing were conducted with limited hunting efforts (in both scale and target area), and which did not have the dramatic unsustainable character of the commercial hunts. They were a source of food, commodities and cash, and represented the mainstay of many of the coastal communities. Today, marine mammals still represent an invaluable resource for many coastal communities of the North providing food and/or income, as well as job opportunities in places where non- marine resources are scarce and job opportunities are few. Coastal whaling and sealing also sometimes supplement seasonally idle fishing activities.

Small scale whaling and sealing, and the associated ecological risks, are very different from the moving-from-one-resource-to-the next type hunting. They support the well-being of the communities to which these activities are necessary. The geographical scope being pre-defined and limited, the continuance of the activity depends upon keeping the stock at a sustainable level. This creates a strong incentive to manage the stocks well. In industrial whaling and sealing, the activity supports a business. The company has no long-term interest in a particular resource, but instead illustrates the *tragedy of the commons*: making the highest profit before others do, then moving on to the next profit-generating activity, a new not yet exploited resource or another activity: there is no incentive for sustainability.

Therefore, the reality of the present harvest of marine mammals is very different from the reality of the last centuries' competitive whaling and sealing - at all levels: its scope, the dramatic improvement in monitoring and management skills (through the work conducted by the Scientific Committee of the IWC, among others) now permitting the sustainable management of stocks, the efficient utilisation of the resources for human consumption with meat as the most important product, and above all the understanding of nature conservation as the prerequisite for human survival and thus the will to preserve marine resources for future generations. The high level of commitment marine mammal users and managers have today for conservation and sustainable use, combined with the limited scale of current and planned exploitation, their geographically limited scope, the lack of industrial markets for whale products and the limited market for whale meat are strong forces contributing to the protection of marine mammal stocks.

8.2 A STRONG INCENTIVE FOR SUSTAINABILITY

"We do not need to be reminded by others of the preciousness of nature's wealth, because it continues to feed us, clothe us and sustain us every day"[68]. Marine mammals are highly necessary in the Arctic for nutritional, societal, cultural and spiritual reasons. Populations making a direct living and surviving

[68] Aleqa Hammond, "Greenland's way forward", speech to Arctic Frontiers conference, Tromsø, 21 January 2014.

off a resource have a very strong interest in managing it in a sustainable way, preserving it for themselves and future generations, and not "cutting the branch they sit on". It is noteworthy that the depletion of whale and seal stocks was due to competitive commercial hunting, and not to subsistence hunting. There are very few examples of stock depletion from subsistence or local harvests, likely due to the interest of the users in protecting the resources at hand. A strong subsistence-based economy is based on a strong conservation ethic.

The World Wildlife Fund (WWF) in 1998 conducted two case studies in western and eastern Canadian Arctic Inuit communities to test the appropriateness of the guidelines it had proposed for the sustainable consumptive use of arctic wildlife (including marine mammals). It concluded that in the two communities examined there existed a strong conservation-oriented philosophy, sets of principles, and an institutional framework for managing wild species on a sustainable basis and that there was no justification for distinguishing between subsistence use and commercial use (Freeman 2001)

The world has evolved and our perceptions of nature and wildlife have changed. The notion and importance of ecosystems, inter-reactional multi directional dynamic entities, has emerged. The necessity of preserving and sustainably manage the marine environment(s), which provide goods and services upon which the world depends, has become evident. The over-exploitation and mismanagement of many marine mammal and fish stocks has prompted efforts and progress in wildlife management theories and methodologies. It is now possible to sustainably manage marine mammal hunting activities, especially as the small non-industrial coastal type practiced in NAMMCO countries makes inspection and enforcement from the catch to the market feasible. The will as well as the know-how for sustainable management both exist.

9. Marine Mammals, a Forgotten Resource?

Although

- many marine mammal stocks are abundant and healthy,
- they represent the primary food resource in some ecosystems, and
- a secure and cautious management framework has been established,

marine mammals are generally over-looked as potential food resources in the discourse on food security. It is not that they are disqualified as potential contributors through sound arguments, but that they are simply ignored (see e.g., Godfray *et al.* 2010, UN 2014, 2015, Potts *et al.* 2016, WEF 2016). Their potential as food resources is overlooked by the highest international institutions when discussing how to feed 9 billion people and at a time when "*Food security and nutrition has become a pressing global challenge underscoring the need for sustainable food sources*" (UN 2014). The 2010 joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption[69] specifically excludes marine mammal consumption. The sustainable use of marine mammals as food resources and as income generators is restricted even for northern communities for which it represents a significant livelihood at a time when food insecurity has become a central concern particularly exacerbated by climate change (e.g., ICC 2012).

But why is the consumption of marine mammals perceived as so controversial, so taboo? Is there an overall misunderstanding of the actual environmental situation and the relative impact of the various pressures and threats to the global environment, based on incomplete or only partially true information?

[69] http://www.fao.org/docrep/014/ba0136e/ba0136e00.pdf

9.1 GENERAL ATTITUDE AGAINST USING MARINE MAMMALS AS FOOD RESOURCES?

Is the taken-for-granted attitude against eating marine mammals as generalised as it seems or is this attitude voiced so loudly that it blurs the real situation?

Using marine mammals as food resource has been common in many parts of the world, including across Western Europe and in Colonial America. It was not necessarily restricted to coastal communities, since flesh and blubber can be salt-cured. After WWII, corned whale meat was available as an unrationed alternative to other meats in the UK[70]. The now taken-for-granted anti-whaling and sealing moral discourse emerged in the middle of the twentieth century from a world were killing – and using and eating - whales and seals was widespread and morally/ethically unquestioned (Epstein 2008). By the late 1970s, Iceland, Brazil, Peru, South Africa, and Spain were all still counted among countries importing Soviet whale meat (Epstein 2008). Regarding the general use of marine mammal products, the U.S. and U.K governments were still maintaining stockpiles of sperm oil and, to a lesser extent, whale oil for national emergencies into the early 1990s (Ellis 1991 in Epstein 2008).

Today, marine mammal consumption is far from being restricted to a few states (whaling nations) or isolated coastal communities and may be increasing. In their report on "The global extent and character of marine mammal consumption by humans: 1970–2009", Robards and Reeves (2011) note that since 1990, people in at least 114 of 195 countries have consumed one or more of at least 87 marine mammal species, including both animals killed deliberately and those killed unintentionally as by-catch or strandings. In 87 of these 114 states, the acquisition was deliberate and targeted, making this the most widespread acquisition category. They note that "Although changing social, ecological, or political circumstances are leading to reduced killing and consumption of marine mammals in some regions, in other regions the prevailing socio-economic conditions and new technologies are leading to increased killing and consumption, particularly of small cetaceans. Consumption of marine mammals is considered a significant aspect of food security and cultural wellbeing in many regions and provides some economic (including cash) benefits to people in at least 54 countries". Their analysis indicates that the number of people taking small cetaceans for food has continued to increase since the 1970s, and that there is a trend towards a greater use of animals killed in fishing gear, regardless of whether they are direct catch or bycatch.

Reviewing the study quoted above, Costello and Baker (2011) concluded (to their dismay) that "People in many countries have no cultural or ethical prohibitions against eating marine mammals". Many tourists in Iceland, Norway and Greenland do not hesitate in trying whale meat, even when coming back from a whale watching trip (e.g., The PlanetD[71], The Guardian[72], Bertulli *et al.* 2016). The sale of minke whale meat seems to be increasing in Iceland[73] at the same time as tourism from the US is[74]. The same is observed in Greenland and Norway.

9.2 MARINE MAMMALS AS ENDANGERED SPECIES?

Are marine mammals endangered *per se* and therefore should be protected *a priori* or is this feeling the result of a general disinformation?

Many people believe that whales are endangered, as if there was a unique ubiquitous whale: "Save the whale". They appear surprised to hear that some species are in danger, while others are thriving, and that within a species some stocks might be flourishing while other stocks need protection, and some are on the brink of extinction. There are over 86 cetacean species (whales and dolphins) and 36 species of pinnipeds (seals and walrus). Many of these species include several stocks or populations

[70] Whacon for U.K. dinners – *The Sunday Times*. Published 8 July 1951. http://trove.nla.gov.au/newspaper/article/59530720

[71] http://theplanetd.com/eating-whale-in-greenland/

[72] https://www.theguardian.com/environment/2012/jun/26/greenland-whale-meat-tourists

[73] http://icelandreview.com/news/2011/08/24/minkes-chase-mackerel-confuse-icelandic-whalers

[74] http://icelandreview.com/news/2016/06/14/iceland-popular-among-likeable-us-tourists

that are reproductively isolated and therefore may have different conservation histories and issues. A perfect example of this is the gray whale which consists of one healthy (non-endangered) population - (the eastern North Pacific with about 22,000 individuals), one critically endangered population (the western North Pacific with about 130 individuals) that requires immediate conservation action, and one extinct population (the North Atlantic). Closer to us, the fin whale is another good example. The Southern Hemisphere population is still dramatically depleted, while the North Pacific population has likely returned to its pre-exploitation level and the North Atlantic fin whale population is likely above the pre-exploitation level (See, e.g., the IUCN Red List). Some species and stocks are on the verge of extinction (or extinct), like the vaquita porpoise (less than 100 animals remaining[75]) and Mãui dolphin (55 individuals over one year of age remaining[76]), while other stocks are healthy and increasing, like the fin and humpback whales in the North Atlantic. Therefore, it does not make sense to say the fin whale is endangered or the Gray whale is abundant. Some populations are, while some are not. The same is true for seals, where different sub-species and stocks of a species can have very different conservation status. Such is the case for ringed seals, for example, with the abundant Arctic ringed seals numbering several millions and the Saimaa ringed seal numbering in the low hundreds.

THE whale and THE seal do not exist and are therefore not endangered. "Save the whale" is equivalent to saying rats are endangered because Kangaroo rats are close to extinction, or cats are endangered because tigers are. Because of the great diversity of habitat, pressures and status, the only sound and biologically sensible way of looking at marine mammal conservation status is at the stock or population level (IWC 2016[77], Smith *et al. in* UN 2016[78]).

Pooling several stocks together under one single species and attributing to that species a single conservation status is not scientifically appropriate and is misleading. It can be very problematic in terms of conservation, especially when the stocks pooled together are of very different size, as the conservation status of the small stocks, good or bad, will be overlooked. The fin whale again is a good example of this. Both CITES and IUCN assess and list the fin whale as an endangered species[79,80], thus grouping the three recognized populations of the North Atlantic, the Southern Hemisphere and the North Pacific into a mega-population, against their own practice. This classification, however, is only valid for the Southern Hemisphere population which is still dramatically below its pre-exploitation level. Indeed, in its regional European assessment IUCN operates, following normal and best practices, with populations. The North Atlantic fin whale population is no longer listed as endangered or even vulnerable[81]. The inconsistency in argumentation and definitions is striking when the minke whale, a related species found in roughly the same waters, is treated differently than the fin whale, and is assessed by population and stocks.

9.3 ARE MARINE MAMMAL SUPRA-MAMMALS?

Why are whales and dolphins perceived by many as especially charismatic and innocent mammals, as "supra-mammals"? Are they as cuddly and innocent as many take them for, or are they more *natural* than they are often perceived?

9.3.1 Fascinating animals

Marine mammals do not fit into our simple categories of fish and mammals. They thrive in a habitat cherished and much coveted, but not conquered by, humans – the underwater world, where they seem to move about effortlessly and for long periods. They are both conspicuous, sometimes exhibiting precise acrobatics, and mysterious, as they completely vanish for long time periods. They

[75]http://news.nationalgeographic.com/news/2014/08/140813-vaquita-gulf-california-mexico-totoaba-gillnetting-china-baiji/. 31/08/ 2016.
[76]http://www.doc.govt.nz/nature/native-animals/marine-mammals/dolphins/maui-dolphin/facts/. 31/08/2016.
[77]IWC website, retrieved June 2016: *Status of whales* at https://iwc.int/status
[78]United Nations World Ocean Assessment, 2016; http://www.worldoceanassessment.org/?platform=hootsuite
[79]https://www.cites.org/eng/app/appendices.php
[80]http://www.iucnredlist.org/details/2478/0
[81]http://www.iucnredlist.org/details/2478/1

migrate over vast areas and regions, some from low latitude tropical waters, where they breed and give birth, to cooler, high latitude polar waters where they feed (e.g., humpback whales). The longevity of some species (over 200 years for bowheads) fascinates, although the longevity of some other long-lived species such as ocean quahog (> 400 years), Greenland shark (200 years) or eels and tortoise (150 years) or the immortal jellyfish do not get much attention**.** They are protective of their offspring, some display sophisticated strategies for gathering food, and they communicate and navigate using mysterious sounds, some over large distances. Some sing. They are difficult to study and count. Some are playful and use boats as toys. Some bond with humans and ally with them to wrangle fish. Some are the largest animals ever to have lived, larger even than the largest dinosaurs. All these traits, especially when lumped together in a single *archetype whale,* contribute to and underpin the idea of whales being friendly supra-mammals, therefore possessing a taken-for-granted supra intelligence. They are majestic ornaments of an imposing environment. They fascinate, they are nature totems. Programmes like "Swimming with dolphins" are presented as the ultimate bounding with nature. This is particularly true for city inhabitants, people disconnected from the realities of nature.

Marine mammals and especially whales fascinate us, but what is also intriguing is how humans connect to these animals. Many myths and legends exist all over the world where marine mammals, usually individuals, play the lead character. Nautical lore is rife with tales of dolphins helping humans on the high seas (e.g., the legend of Paikea[82] in New Zealand), and sometimes they'll even go out of their way to help other aquatic species, too. The remarkable destiny of the novel "Moby Dick" by Herman Melville (1851) perhaps best exemplifies this. The novel is ranked by many as equal to novels like "War and Peace", "Don Quixote" and "Wuthering Heights" in world literature. Most people seem to know about it and about Moby Dick, although many without having read the novel. Through glorification in myths and legends and by attributing human characteristics to them, the idea of marine mammals as special and dignified animals that should not be hunted has emerged, developed and gained foothold in the mind of the general public. *"Our ocean-going mammalian counterparts possess many admirable qualities and characteristics that endear them to us like few other species on Earth"*[83]. The recent "super whale", with all its cetacean and human qualities has proved to have enormous economic and political potential (Kalland, in Freeman and Kreuter 1994).

The protection and hunting of marine mammals seems to illustrate a *clash of cultures* (Norden 2013) between urban and more traditional lifestyles. Ironically native and aboriginal people have long been fascinated by marine mammals and have certainly spent more time observing and learning about them, enjoying them more than most urban dwellers. They do not know them as iconic animals, but they do know them from daily life and encounters, and from centuries spent in observing them. They consider them beautiful animals but at the same time also see them as a food resource. They revere and respect them, and hunt and consume them. In Inuit values, the animals are sentient, and like humans and all elements of nature have a soul[84]. They are thus aware of the thoughts, speech, and actions of hunters, and from there choose to participate or not in encounters with hunters. To be successful, the hunter must have the right attitude and intent. For example, the food must be needed, the intention should be of utilising the animals as fully as possible for food, and the food produced should be shared - even after capture, animals belong to all. A reciprocity exists between hunter and animal, between one person and another, and between the human community and the natural environment (e.g., Wenzel 1992).

9.3.2 Fascinating but not "*innocent*"

Noticeably enough, some of marine mammals' other less "friendly" qualities are not highlighted. Their skills as efficient and brutal apex predators are not underlined, as it is for sharks for example. Although they have similar diets, sharks are perceived as vicious while dolphins are seen as cute. If anything, dolphins are cleverer and more strategic in their killing methods. Killer whales are well-known team

[82] http://whales.fieldmuseum.org/behind/people/maori-whale-riders
[83] http://www.treehugger.com/natural-sciences/10-awesome-examples-dolphins-being-awesome.html
[84] https://www.religion.dk/viden/de-ti-vigtigste-ting-vide-om-inuit-religion

killers and use different strategies for different prey such as harassment of mother-calf pairs (whales and dolphins), wave-washing (seals), beach storming (sea lions, elephant seals), "karate chop" (sharks), pod pin (narwhals), blowhole block (large whales) and carousel (fish)[85]. The killing-not-for food behaviour of some species, both towards their counterparts and other marine mammals, remains largely untold as is their picky-consumer side (killing a large whale and only eating small bites of it, only the tongue for example). Their harsh and aggressive behaviour, both sexual (rape of females and subordinate males) and against pups is not much depicted.

The wider public believes, or is made to believe, that marine mammals are cute, cuddly, and innocent, but sharks are cruel, evil and bad. Many shark species face serious conservation issues, but few people care. Marine mammals are both nature at its likable side and at its worst, they are *nature* and nature is, *by definition*, an amoral world, where survival and gene-spreading are the key elements. Killer whales and sharks are not amoral, they are what they should be, what nature made them, efficient and effective top predators.

9.4 AN ETHICAL ISSUE?

Ethics can be defined as the moral values and rules which govern our conduct. It tells us what is right and what is wrong and is a choice between alternatives. It varies between cultures, religions and even between individuals and often involves very emotional discourses. This is particularly true for animal ethics. As part of the debate on the human duties towards animals and animal rights, the ethical aspect of using wild animals as food resources, including marine mammals, has been discussed revealing a clash of cultures between *killing and using* vs *preservation*, between a more traditional utilitarian view and a mostly urban dialogue. Palmer and Sandøe (2011) underline that "*It's important to adopt a reasoned approach to animal ethics, rather than one based on feelings alone. Reliance on feelings makes for difficulty in entering ethical debates, and in explaining to others why particular attitudes or practices are either problematic or beneficial*".

Throughout time, wild animals have been a critical resource for humans and human survival. Wild animals have been fished, trapped, and hunted to acquire food, clothing and tools. Wild animals also have assumed cultural and spiritual significance and been objects of reverence, as witnessed by cave paintings, rock carvings, mythology, and more modern art pieces. Over the last few centuries different moral visions of the right of humans to utilize wildlife have emerged. Three key concepts - wise or sustainable use, preservation (protect nature from use), and animal welfare – are today central to the discussions concerning the use and management of wild animals (Sandøe *et al.* 2008). Both the *wise use of nature* and the *preservation of nature* approach rejects the marginalisation or destruction of wildlife and underline the responsibilities humans have towards wild animals.

The people's right to utilise natural resources lies at the very core of NAMMCO and NAMMCO countries, which considers that the use of marine mammals is ethically defensible if it is sustainable and responsible (minimising suffering and resource waste).

9.5 ANOTHER SIDE OF ETHICS - WHERE SHOULD THE REAL FOCUS BE?

Human impacts on marine mammals and their environment are both direct and indirect, local and global, affecting the conservation of marine mammal populations at different levels of magnitude. Whaling and sealing in the NAMMCO context are local, controlled, and managed stressors, with impacts limited to the individual level and not impairing stock survival. The direct and indirect effects of climate change and pollution of the marine environment are in essence global stressors, which will *globally* affect the marine environment with long-term or irreversible consequences. However, it

[85] E.g. see http://www.pbs.org/wnet/nature/killer-whales-killer-weapon-brain/11352/

seems that these global threats have great difficulty getting the focus of the wider western urban public and triggering real political consensus – and *effective* actions.

Climate change, which in the Arctic will have serious negative impacts on ice cover dependent wild species, has been described as a "perfect moral storm" (Gardiner 2011). It embraces global, intergenerational and theoretical dimensions, scientific uncertainty and the skewed vulnerability of those least responsible. It confronts serious ethical issues of fairness and responsibility across individuals, nations, generations, and the rest of nature (Gardiner and Hartzell-Nichols 2012). Global warming, which is affecting the Arctic at a rate of almost twice the global average, will have severe effects on living conditions both for people and wildlife. The natural habitat of ice-dependant species (e.g., polar bear, walrus and ringed seal) will diminish dramatically, seriously affecting these species' resilience.

Global stressors, like POPs contamination, have impacts thousands of kilometres away from their origins. They affect the overall health, resilience, and sustainability of Arctic species, thus affecting the food security of coastal communities who have had little contribution to producing these stressors. In specific cases, they are likely to affect species survival much more than controlled sustainable removals. Pollution is likely already bringing dysfunction and extinction in uncontrolled ways for some European marine mammal populations, like killer whales, bottlenose dolphins and harbour porpoises, as well as other wildlife (Murphy *et al.* 2015, Jepson *et al.* 2016, Jepson and Law 2016).

The cessation of controlled and sustainable harvests is asked for in the name of ethics and the preservation of marine mammals. However, the uncontrolled removals of a higher number of marine mammals through by-catch and entanglements in fishing gear, which is in essence more detrimental to marine mammal conservation, continues with limited monitoring, assessment of the effects or mitigation. In fact, there is strong stakeholders' pressure for limiting the scope of any by-catch regulations and their implementation - as for example in the European Union with Council Regulation (EC) No 812/2004, as well as for limiting the scope of any new monitoring efforts. It appears that incidental catches, or by-catch, seem to be less of an ethical issue than direct catches, as they are incidental and therefore direct human responsibility is not engaged. But is it ethically correct to consider these catches *incidental* when the risks of by-catch are foreseeable and predictable? Certain types of gear, in certain areas, and used in a certain way are known, and have long been known, to catch marine mammals. If marine mammals should be protected *in essence* and not because they are endangered, then all effort should be taken, and it should be highly prioritised to stop these catches by any means and at any cost. This is especially so when the animals are simply discarded and wasted, i.e., do not contribute to the well-being or survival of any human communities, and when there are significant animal welfare issues, as is the case with by-catch and entanglements in fishing gear.

In the name of ethics and morality, coastal communities are required by outsiders not affected by the consequences to abandon local food resources, resources with societal, cultural, and spiritual value, that are abundant, not threatened and have high nutritional quality, for the benefit of imported foods that are flown in, are expensive with intrinsic uncontrollable prices, and are of lower nutritional quality with a higher carbon footprint. Recalling the implications and meaning of food security as defined by the World Summit on Food Security, is it ethically acceptable that a group of persons or an entire nation pass judgement on other people's food preferences? And this especially when harvesting is done in a sustainable and responsible manner and taking into considerations animal welfare issues?

10. Conclusion: Marine Mammals – Why Not?

The management and use of wild animals generate ethical disagreements and dilemmas in which human needs, preferences, and interests, concern for individual animal welfare, and the value of biodiversity, ecosystems, and wild nature are part of the discussion (Gamborg *et al*. 2012).

NAMMCO parties strive to reconcile cultural diversity and environmental/moral principles. NAMMCO strives to ensure the sustainability of any removals, whether the resulting products are consumed locally for free, sold on national and international markets, or dumped back to the sea as by-catch. Provided they are strictly regulated to ensure that they are sustainable and responsible, whaling and sealing are environmentally sound ways of obtaining food.

Marine mammals are overlooked as potential food resources because of the resistance of some to see them as such for a variety of reasons, which include wildlife conservation and food safety, but are mainly grounded on moral and ethical arguments of animal rights. Marine mammals, in particular whales and dolphins, are perceived of as a unique animal category, a charismatic endangered category, one which should not be seen as a resource. Although recognising the majestic appearance of many marine creatures - not the least whales and other marine mammals, NAMMCO countries do not distinguish between charismatic or non-charismatic species. Every component of the marine ecosystem has its importance and its synergic role to play. Marine living creatures, from plankton to marine mammals, are all potential resources. Healthy populations may be harvested to contribute to ensuring food security. Harvests, however, should be soundly managed under five overall principles: an *ecosystem-based approach (*integrated management of human activities based on the best available scientific and traditional knowledge about the ecosystem*), sustainability* (sustainable use underpinned by effective science-based conservation measures), *responsibility* (best practices, minimization of animal suffering and food waste), *transparency* (documented and accessible management processes) and *accountability* (to the environment, the users and the wider public).

Environmental non-governmental organizations (NGOs) have raised public awareness of the need for wildlife protection, which has been very beneficial to conservation, and in the case of marine mammals has allowed many depleted population and stocks to recover. However, the agenda has been steered away from *wise or sustainable use* towards *total preservation* and/or a focus on the protection of wild animals from cruelty. This is particularly evident in the debate about the protection and conservation of marine mammals. The IWC was set up after World War II to regulate the hunting of large whales and ensure that whale species would not be depleted – i.e., that they would be restored to and maintained at a level that would allow whaling in the future. However, in the following decades, most IWC members turned towards the idea of banning all commercial whaling. The “temporary” ban implemented in 1986 has not been lifted – even for populations of whales that are recognised as healthy by the IWC itself and could tolerate controlled harvests.

Many of the marine mammal stocks in the NAMMCO area can unquestionably support controlled removals. The ethical dilemma, the choice between using and not using them as food resource should be viewed in a holistic, ecosystem-based perspective. What is environmentally ethical, i.e., which alternative bears the lowest ecological cost? In the Arctic, the alternative to the controlled, non-polluting, and energy-efficient use of a local, preferred, renewable, highly nutritive, societally and culturally meaningful resource is to import flown-in food of lower nutritional quality. Any flown-in meat or vegetable will result in an increased carbon footprint (all foods), increased animal welfare concerns (livestock incl. poultry), increased GHGs emissions (livestock, which accounts for 51% of annual worldwide human-caused GHGs emissions) and increased deforestations (all foods).

Who should decide: the coastal communities who will bear the consequences of the choice or the outside world who will not face any of the consequences? As the harvests in question are sustainable

and the cultural and supporting services provided by the resources will therefore be maintained for humanity, NAMMCO parties believe that it is most ethical to give responsibility to the coastal communities to decide whether they want to use healthy marine mammal stocks as food resources.

NAMMCO supports ecological, social and cultural diversity and sustainability and encourages a holistic debate, where the real and global threats to marine ecosystems are addressed. Explicit consideration of the values at stake along with science-based information are the key elements to any nuanced dialogue on the use of any resources, including marine mammals. Information is a prerequisite to balancing the *rights to and interests in* a sustainable existence of coastal communities with the local and global cultural value of marine mammals, i.e., balancing their ecosystem value as provisioning (providing food) and cultural services.

As pointed out by Johansen (2006), it is probably neither ethically sound nor environmentally prudent to base the management of living resources on the commandment in George Orwell's Animal Farm: "All animals are equal, but some animals are more equal than others". The marine mammals exploited by NAMMCO countries, and at the present scale, are clearly not threatened, therefore the efforts and money spent in stopping seal hunting and small coastal whaling would be better spent on animal species that were worse off, and on pressing issues more universal in character and consequences, by-catch and marine pollution for example. As Dorsey (2013) underlines, marine mammals should not share the fate of the bison: saved from extinction but with its ecosystem vanished and therefore left as a zoological curiosity.

In the face of climate and other environmental changes and their unforeseeable consequences for both marine mammals and local communities, NAMMCO strongly emphasizes that it is essential to join forces. Scientific cooperation between organisations dealing with marine mammal conservation should be strengthened for the benefits of seals and whales (NAMMCO 2016b) and focus and acts should be directed towards conservation issues of importance to the global environment.

Seal skins drying in Disco Bay, West Greenland. © F. Ugarte

REFERENCES

AC [Arctic Council]. 2013. Ecosystem-Based Management in the Arctic. Arctic Council. 63pp.

ACIA. 2005. Arctic Climate Impact Assessment. Cambridge University Press. 1042pp.

Alverson, D.L.; Freeberg, M.H.; Pope, J.G.; Murawski, S.A. 1994. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper. No. 339. Rome, FAO. 1994. 233p. http://www.fao.org/docrep/003/T4890E/T4890E00.htm#TOC

Anon. 2002. The Faroe Island – a North Atlantic perspective on sustainable development. Tòrshavn, Prime Minister Office.

Anon. 2003-2004. Norsk sjøpattedyrpolitikk [Norwegian White paper on marine mammals]. Det Kongelige Fiskeridepartment. St.meld. nr.27. 125pp. http://odin.dep.no/

Anon. 2008-2009. Norsk sjøpattedyrpolitikk [Norwegian White paper on marine mammals). Det Kongelige Fiskeridepartment. St.meld. nr.46. 40pp. http://odin.dep.no/

Anon. 2011a. Risks versus Benefits of Whale and Seal Consumption. Workshop Report, January 14, 2011, Copenhagen. Norden. http://setur.fo/fileadmin/user_upload/NVD/Horaldur/Workshop_Report.pdf

Anon. 2011b. Norwegian Scientific Committee for Food Safety: Human pathogens in marine mammal meat, ISBN 978-82-8259-018-1. http://www.vkm.no/dav/2d1eef41a7.pdf

Anon. 2014. Norwegian Environment Agency. Scientific Basis for the updating of the Norwegian Management plan for the Norwegian Sea. 248pp

Baines et al. 2015. Investigating the effects of Arctic dietary intake on lung health. Eur J Clin Nutr. 2015 May 27. Doi: 10.1038/ejcn.2015.85.

Bejder, L., Samuels, A., Whitehead, H. et al. 2006. Decline in Relative Abundance of Bottlenose Dolphins Exposed to Long-Term Disturbance. *Conservation Biology*, 20: 1791–1798.

Bertulli, C.G., Leeney, R.H, Barreau, T. and Matassa, D.S. 2016. Can whale-watching and whaling co-exist? Tourist perceptions in Iceland Journal of the Marine Biological Association of the United Kingdom 96(4), 969–977.

Bogstad, B., Gjøsæter, H., Haug, T. and Lindstrøm, U. 2015. A review of the battle for food in the Barents Sea: cod vs. marine mammals. Frontiers in Ecology and Evolution 3:29. 17pp.

Caddell, R. 2013. Marine Mammal Management in the North Atlantic: Challenges and Opportunities for NAMMCO. Presentation to the 21st Council Meeting of NAMMCO, September 2012, Svolvær, Norway. *In* NAMMMCO Annual Report 2012. North Atlantic Marine Mammal Commission. Tromsø, Norway. 642pp.

Caulfield, R.A. 1997. Greenlanders, whales and whaling: Sustainability and self-determination in the Arctic. University Press of New England. 203pp. Clapham, P.J., Young, S. and Brownell, Jr., R. 1999, Baleen Whales: Conservation Issues and The Status of The Most Endangered Populations. *Publications, Agencies and Staff of the U.S. Department of Commerce.* Paper 104. http://digitalcommons.unl.edu/usdeptcommercepub/104

CCA [Council of Canadian Academies]. 2014. Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge, Ottawa, ON. The Expert Panel on the State of Knowledge of Food Security in Northern Canada, Council of Canadian Academies. 256pp.

Clapham, P.J. 2016. Managing leviathan: Conservation challenges for the great whales in a post-whaling world. *Oceanography* 29(3), http://dx.doi.org/10.5670/ oceanog.2016.70.

Cone, M. 2005. Silent snow – the slow poisoning of the Arctic. Grove Press.

Costa, D.P., Weise, M.J. and Arnould, J.P.Y. 2006. Potential influences of whaling on the status and trends of pinniped populations. Chap. 17. *In*. J.A. Estes, D. Demaster, D.F. Doak et al, eds, Whales, whaling and ocean ecosystems. University of California Press, Los Angeles. 401pp

Costello, M.J. and Baker, C.S. 2011. Who eats sea meat? Expanding human consumption of marine mammals. Biological Conservation 144: 2745–2746. http://www.scienceadvice.ca/uploads/eng/assessments%20and%20publications%20and%20news%20releases/food%20security/foodsecurity_fullreporten.pdf

Dewailly E, Mulvad, G.,Pedersen, H.S et al. 2003. Inuit are protected against prostata cancer. Cancer Epidemiol Biomarkers Prev *12;* 926. http://cebp.aacrjournals.org/content/12/9/926.long

Dorsey, K. 2013. Whales and Nations.Environmental Diplomacy on the High Seas. University of Washington Press. 370pp.

Egeland, G. M., Pacey, A., Cao, Z. and Sobol, I. 2010. Food Insecurity among Inuit preschoolers: Nunavut Inuit Child Health Survey, 2007-2008. Canadian Medical Association Journal. 182(3): 243-248.

Egeland, G.M., Williamson-Bathory, L., Johnson-Down, L., Sobol, I. 2011. Traditional food and monetary access to market-food: correlates of food insecurity among Inuit preschoolers. International Journal of Circumpolar Health, 70(4), 373-383.

Ellis, R. 1991. Men and whales. Alfred A. Knopf, New York. 542pp.

Epstein, C. 2008. The power of words in international relations. Birth of an anti-whaling discourse. The MIT Press. (Politics, Science, and the Environment). Cambridge, Massachusetts. 333pp.

FAO 1995. The role of fisheries in food security. Committee on Fisheries, 21st Session, 10-15 March 1995. Paper COFI/95/Info.10. FAO, Rome.

FAO. 2009. FAO and Traditional Knowledge: The Linkages with Sustainability, Food Security and Climate Change Impacts. FAO, Rome. 9pp.

FAO. 2016. Climate change and food security: risks and responses. Available at http://www.fao.org/3/a-i5188e.pdf

Fielding, R. 2011. Environmental change as a threat to the pilot whale hunt in the Faroe Islands. Polar Research 29:430-8.

Freeman, M.M.R. 2000. Endangered peoples of the Arctic. Struggles to survive and thrive. The Greenwood Press, London. 279pp.

Freeman, M.M.R. 2001. Small-scale whaling in North America. In J. R. McGoodwin, ed., Understanding the Cultures of Fishing Communities: A Key to Fisheries Management and Food Security. FAO Fisheries Technical Paper 401. Available at http://www.fao.org/docrep/004/Y1290E/y1290e0f.htm#bm15

Freeman, M.M.R. 2005. "Just one more time before I die": Securing the relationship between Inuit and whales in the Arctic regions. Senri Ethnological Studies 67: 59-76.

Freeman, M.M.R., Bogoslovskaya, L., Caufield, R.A. et al. 1998. Inuit, whaling and sustainability. Walnut Creek, CA: AltaMira Press. 208pp.

Freeman, M.M.R. and Kreuter, U.P. (eds) 1994. Elephants and whales. Resources for whom? Gordon and Breach Science Publishers. 321pp.

Ford, J.D. and Goldhar, C. 2012. Climate change vulnerability and adaptation in resource dependent communities: a case study from West Greenland. Clim. Res. Vol. 54(2): 181–196.

Gambell, R. 1999. The International Whaling Commission and the contemporary whaling debate. Pp. 179 -198, in J.R.Jr. Twiss and R. Reeves, eds, Conservation and Management of marine mammals. Smithsonian Institution Press, 471pp.

Gamborg, C., Palmer, C. & Sandoe, P. 2012. Ethics of Wildlife Management and Conservation: What Should We Try to Protect? *Nature Education Knowledge* 3(10):8.

Gardiner, S.M. 2011. *A Perfect Moral Storm: The Ethical Challenge of Climate Change*. Oxford, UK: Oxford University Press.

Gardiner, S. M. and Hartzell-Nichols, L. 2012. Ethics and Global Climate Change. *Nature Education Knowledge* 3(10):5.

GEAS. 2012. Growing greenhouse gas emissions due to meat production. Global Environment Alert Service - UNEP. 10pp. Available at http://www.unep.org/pdf/unep-geas_oct_2012.pdf.

GESAMP. 2015. "Sources, fate and effects of microplastics in the marine environment: a global assessment" (Kershaw, P. J., ed.). (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 90, 96 p.

Godfray, H.C.J., Beddington, J.R., Crute, I.R., et al. 2010. Food security: The challenge of feeding 9 billion people. Science (Review) 327: 812-18.

Goldhar, C**.**, Ford, J.D., Berrang-Ford, L. 2010. Prevalence of food insecurity in a Greenlandic community and the importance of social, economic and environmental stressors. Int J Circumpolar Health 69(3):285-303.

Goodland, R. and Anhang, J. 2009. Livestock and Climate Change. What if the key actors in climate change were pigs, chickens and cows? Worldwatch November/December 2009, Worldwatch Institute, Washington, DC, USA, pp. 10–19.

Government of Greenland. 2012. White paper on management and utilisation of large whales in Greenland. In International Whaling Commission IWC/64/ASW7 2014. 95pp.

Grandjean, P., Henriksen, J.E., Choi, A.L., et al. 2011. Marine food pollutants as a risk factor for hypoinsulinemia and type 2 diabetes. *Epidemiology* 22:410–417.

Grønnow, B. and Meldgaard, M. 1988. Boplads i dybfrost: fra Christianshåb Museums udgravninger på vestgrønlands ældste boplads. *Naturens Verden*: 409–440.

Hansen, J.C., Deutch, B. and Odland, J.Ø. 2008. Dietary transition and contaminants in the Arctic: emphasis on Greenland. Oulu: International Association of Circumpolar Health. p. 1-96.

Hardy, B. 2006. A regional approach to whaling: how the North Atlantic Marine Mammal Commission is shifting the tides for whale management. Duke Journal of Comparative & International Law 17:169-198.

Heide-Jørgensen, M.P., Laidre, K., Borchers, D., et al. 2007. Increasing abundance of bowhead whales in West Greenland. Biol. Lett. (2007) 3, 577–580. http://rsbl.royalsocietypublishing.org/content/roybiolett/3/5/577.full.pdf

Higham, J., Bejder, L. and Williams, R. (eds.). 2014. *Whale-watching: Sustainable Tourism and Ecological Management*. Cambridge University Press, Cambridge, UK, 387 pages.

Huet, C., Rosol, R., Egeland, G.M. 2012. The Prevalence of Food Insecurity is High and the Diet Quality Poor in Inuit Communities. The Journal of Nutrition 142(3): 541-7.

ICC [Inuit Circumpolar Council]. 2012. Food security across the Arctic. Background paper of the Steering Committee of the Circumpolar Inuit Health Strategy. 12pp. available at http://www.inuitcircumpolar.com/uploads/3/0/5/4/30542564/icc_food_security_across_the_Arctic_may_2012.pdf

IPCC [Intergovernmental Panel on Climate Change]. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (eds. S. Solomon, D. Qin, M. Manning, Z).

IPCC [Intergovernmental Panel on Climate Change]. 2013. *Climate change 2013: the physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom.

IPCC [Intergovernmental Panel on Climate Change]. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

ITK [Inuit Tapiriit Kanatami] and ICC. 2012. Inuit and the Right to Food. Submission to the United Nations Special Rapporteur on the Right to Food for the Official Country Mission to Canada. 14pp. http://www.inuitcircumpolar.com/uploads/3/0/5/4/30542564/icc.itk.inuit_and_the_right_to_food-for_un_rapporteur_on_the_right_to_food.pdf

Jepson, P.D., Deaville, R., Barber, J.L., et al. 2016. PCB pollution continues to impact populations of orcas and other dolphins in European waters. Nature - Scientific Reports 6: 18573 | DOI: 10.1038/srep18573 1. 17pp. Jepson, P.D. and Law. 2016. Persistent pollutants, persistent threats. *Science* 17 (352): 1388-1389.

Joensen, J. P. 2009. Pilot Whaling in the Faroe Islands. History. Ethnography. Symbols. Tórshavn, 295 pages. Faroe University Press. ISBN: 978-99918-65-25-6

Johansen, H.P. 2006. Opposition to whaling – arguments and ethics. *In* J.E. Ringstad, ed, *Whaling and History II – New perspective*, Whaling Museum of Sandefjord.192pp.

Laidre, K., Stern, H., Kovacs, K.M., et al. 2015. Arctic marine mammal population status, sea ice habitat loss, and conservation recommendations for the 21st century. Conservation Biology, Volume 29(3): 724–737.
Lal, R., Miller, F.P. & Logan, T.J. 1988. Are intensive agricultural practices environmentally and ethically sound? Journal of Agricultural Ethics 1(3): 193-210.
Law, K.L. and Thompson, R.C. 2014. Microplastics in the Sea. Science 345(6193):144-5.
MacDonald, J. P., Huet, C. and Ford, J. 2015. The commercialization of country food and food security: The case of Greenland and what Nunavut can learn. Abstract. 16th International Congress on Circumpolar Health, June 8-12, Oulu, Finland. http://icch16.oulu.fi/site/files/Abstracts/Poster-abstracts/C9.pdf
Mulvad, G.,Pedersen, H.S, Hansen, J.C., et al. 1996: The Inuit diet. Arctic Med Res. 55 Suppl. 1:20-4.
Murphy, S., Barber, J.L., Leamonth, J.A., *et al. 2015.* Reproductive failure in UK harbour porpoises *Phocoena phocoena*: legacy of pollutant exposure? *PLOS ONE* **10(7),** e0131085. doi: 10.1371/journal.pone.0131085
NAMMCO. 2000. Report of the Scientific Committee. In: NAMMCO Annual Report 1999. NAMMCO, Tromsø, Norway, pp. 125-211. [Fin whale from page 143]
NAMMCO 2005. Report of the NAMMCO Workshop on Hunting Methods for Seals and Walrus. Pp 63-126. *In* NAMMMCO Annual Report 2004. North Atlantic Marine Mammal Commission. Tromsø, Norway. 353pp.
NAMMCO. 2007. Expert meeting on potential positive health effects of consuming whale and seal oil. 3 October 2007. Copenhagen, Denmark. North Atlantic Marine Mammal Commission. Tromsø, Norway. 16pp.
NAMMCO. 2000. Report of the NAMMCO Scientific Committee Working Group on North Atlantic Fin whales. Pp 189-214. In NAMMMCO Annual Report 1999. North Atlantic Marine Mammal Commission. Tromsø, Norway. 265pp.
NAMMCO. 2001. NAMMMCO Annual Report 2000. North Atlantic Marine Mammal Commission. Tromsø, Norway. 359pp.
NAMMCO. 2016a. Report of the Meeting of the Working Group on Coastal Seals, March 2016, Reykjavík, Iceland. *In* Report of the 2016 Meeting of the NAMMCO Scientific Committee.
NAMMCO. 2016b. Annual report 2015. North Atlantic Marine Mammal Commission. Tromsø, Norway. 374pp.
NAMMCO. 2016c. Report on the Symposium on "Impacts of Human Activities on Arctic Marine Mammals". October 2015, Copenhagen, Denmark. North Atlantic Marine Mammal Commission. Tromsø, Norway.
Niclasen, B., Davison, C., King, N., Pickett, W.L. 2015. Self-assessed food poverty among school children - a comparison between Greenland and Northern Canada. Abstract. 16th International Congress on Circumpolar Health, June 8-12, Oulu, Finland. http://icch16.oulu.fi/site/files/Abstracts/S19P04.pdf
Niclasen, B., Molcho, M., Arnfjord, S.and Schnohr, C. 2013b. Conceptualizing and contextualizing food insecurity among Greenlandic children. International Journal of Circumpolar Health, [S.l.], v. 72. ISSN 1797-237X. Available at: <http://www.circumpolarhealthjournal.net/index.php/ijch/article/view/19928>. Date accessed: 21 Mar. 2016. doi:http://dx.doi.org/10.3402/ijch.v72i0.19928.
Niclasen, B., Petzold, M. and Schnohr, C.W. 2013a. Adverse health effects of experiencing food insecurity among Greenlandic school children. Int J Circumpolar Health. 2013; 72: 10.3402/ijch.v72i0.20849.
NIFES [Norwegian Food Safety Authority]. 2012. Årsrapport 2011, Mattilsynet. Fremmedstoffer I villfisk med vekt på kystnære farvann: Delrapport II- undesøkelser av hval. NIFES August 20 http://nifes.no/wp-content/uploads/arsrapport-fremmedstoffer-i-villfisk-2011-hval-9-okt-.pdf
Norden. 2013. Hunting and Protecting of Marine Mammals – A Clash of Cultures? Nordic Committee on Bioethics. Retrieved from http://ncbio.org/nordisk/arkiv/mammals-report-final.pdf
Norden. 2015. Synthesis Report. Blue Growth in the North East Atlantic and Arctic. Working paper. Nordic Marine Think Tank. 35 pp. Retrieved from http://cdn.norden2015.fo/media/1077/synteserapport-sidste-version-tema-nord-format-fin.pdf
Øigård, T.A., Haug, T. & Nilssen, K.T. 2014. Current status of hooded seals in the Greenland Sea. Victims of climate change and predation? Biol. Conserv. 172: 29-36. doi.org/10.1016/j.biocon.2014.02.007)
Palmer, C. and Sandøe, P. 2011. Animal ethics. In M. C. Appleby, J. A. Mench, I. A. S. Olsson, & B. O. Hughes (Eds.), Animal welfare. (2. ed., pp. 1-12). Chapter 1. CABI Publishing.
Papatsie, L. Ellsworth, L., Meakin, S. and Kurvits, T. 2013. "The right to food security in a changing Arctic: The Nunavut Food Security Coalition and the Feeding My Family campaign", Hunger, Nutrition, Climate Justice 2013, A new Dialogue: Putting People at the Heart of Global Development, 15-16 April 2013. https://issuu.com/departmentofforeignaffairs/docs/hncj_conference_papers
Pardilla, M., Prasad, D., Suratkar, S., and Gittelsohn, J. 2013. High levels of household food insecurity on the Navajo Nation. Public Health Nutrition. doi:10.1017/S1368980012005630. otts,
J., Wilkings, A., Lynch, M. and McFatridge, S. 2016. State of Sustainability Initiatives Review: Standards and the Blue Economy. 207pp. International Institute for Sustainable Development (IISD). ISBN: 978-1-894784-74-0. Retrieved from https://www.iisd.org/sites/default/files/publications/ssi-blue-economy-2016.pdf.
Potts, J., Wilkings, A., Lynch, M. and McFatridge, S. 2016. State of Sustainability Initiatives Review: Standards and the Blue Economy. International Institute for Sustainable Development. 208pp. Available at http://www.iisd.org/ssi/standards-and-the-blue-economy/
Read. A.J. 2008. The looming crisis: interactions between marine mammals and fisheries. Journal of Mammal 89: 541−548.
Read, A.J., Drinker, P., and Northridge, S. 2006. *Bycatch of marine mammals in the U.S. and Global Fisheries.* Conservation Biology 20(1): 163-169.
Reeves, R.R., Ewins, P. J., Agbayani, S., et al. 2014. Distribution of endemic cetaceans in relation to hydrocarbon development and commercial shipping in a warming Arctic. Marine Policy 44: 375-389.
Reeves, R.R., McClellan, K. and Werner, T.B. 2013. Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011. E*ndangered Species Research* 20:71–97, http://dx.doi.org/ 10.3354/esr00481.
Robards, M.D. and Reeves, R.R. 2011. The global extent and character of marine mammal consumption by humans: 1970–2009. Biological Conservation 144: 2770–2786.

Rosol, R., Huet, C., Wood, M., et al. 2011. Prevalence of affirmative responses to questions of food insecurity: International Polar Year Inuit Health Survey, 2007-2008. International Journal on Circumpolar Health. 70(5): 488-497.
Sakakibara, C. 2011. Climate Change and Cultural Survival in the Arctic: People of the Whales and Muktuk Politics. American Meteorological Society - Ways of Knowing special collection. Journals online 3: 76-89.
Sanderson K. 1992. Grindadráp: a textual history of whaling traditions in the Faroes to 1900. MPh thesis, University of Sydney.
Sanderson K. 1994. "Grind"—ambiguity and pressure to conform: Faroese whaling and the anti-whaling protest. In M. Freeman & U.P. Kreuter (eds.): Elephants and whales: resources for whom? Pp. 187–201. Basel: Gordon and Breach.
Sanderson, K. and Gabrielsen, G. W., eds. 1996. Marine mammals and the marine environment. A collection of papers presented at the International Conference on Marine Mammals and the Marine Environment, Lerwick, Shetland, 20-21 April 1995. Special Issue. The Science of the Total Environment 186(1,2).
Sandøe, P., Christiansen, S. B. and Holst, B. 2008. Management and use of wild animals. In Ethics of animal use. (pp. 153-164). Chapter 10. Chichester: Blackwell Publishing Ltd.
Searles. E. 2002. Food and the Making of Modern Inuit Identities." Food & Foodways: History & Culture of Human Nourishment 10: 55–78.
Seersholm, F.V., Pedersen, M.V., Jensen Søe, M., et al. DNA evidence of bowhead whale exploitation by Greenlandic Paleo-Inuit 4,000 years ago. Nature Communication, DOI: 10.1038/ncomms13389.
Shoemaker, N. 2005. Whale meat in American history. Environmental History, 10 (2). pp. 269-294.
Sims, M., Cox, T. and Lewison, R. 2008. Modeling spatial patterns in fisheries bycatch: improving bycatch maps to aid fisheries management. Ecol Appl. 18(3):649-61.
Steinfeld, H., Gerber, P., Wassenaar, T., et al. 2006. Livestock's long shadow: Environmental issues and options. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. 391pp. Available at http://www.fao.org/docrep/010/a0701e/a0701e00.HTM
Sugino, T., Yasunaga, G. and Fukuda, M. 2013. Effect of whale meat extract on fatigue induced by physical load and by daily activities in humans. *Jpn. Pharmacol. Ther* 41 (9): 879-893 (in Japanese).
Tarasuk, V., Mitchell, A. and Dachner, N. 2016. Household Food Insecurity in Canada, 2014. PROOF. Retrieved from http://proof.utoronto.ca/
Thomas, P.O., Reeves, R.R. and Brownell, R.L. Jr. 2015. Status of the world's baleen whales. *Marine Mammal Science*, http://dx.doi.org/10.1111/mms.12281.
Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R. and Polasky, S. 2002. Agricultural sustainability and intensive production practices. *Nature* 418, 671-677. http://www.nature.com/nature/journal/v418/n6898/full/nature01014.html
UN [United Nations]. 2014. General Assembly. Document A/69/71 to the fifteenth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, entitled: "The role of seafood in global food security". 36pp.
UN [United Nations]. 2015. General Assembly. Document A/70/74 to the sixteenth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, entitled: ""Oceans and sustainable development: integration of the three dimensions of sustainable development, namely, environmental, social and economic"". 40pp. file:///C:/Users/gde/Documents/NAMMCO/Documents%20en%20preparation/Food%20security/UN-2015.pdf
UN [United Nations]. 2016. The First Global Integrated Marine Assessment. World Ocean Assessment I – Chapter 37. Marine mammals. ttp://www.un.org/Depts/los/global_reporting/WOA_RPROC/Title_Page.pdf
UNEP [United Nations Environment Programme]. 2007. Global Outlook for Ice and Snow. UNEP/GRID-Arendal, Norway. Available at http://www.unep.org/geo/geo_ice/PDF/full_report_LowRes.pdf
UNEP [United Nations Environment Programme]. 2013. Blue economy concept paper. Retrieved from https:// sustainabledevelopment.un.org/content/ documents/2978BEconcept.pdf
UNESCO. 2010. Energy Flow, Environment and Ethical Implications for Meat Production. ECCAP WG13 Report. 66pp. available at http://www.eubios.info/yahoo_site_admin/assets/docs/ECCAPWG13.83161418.pdf
Valdersnes, S., Måge, A., Waagbø, R., Lunestad, B.T. and Frøyland, F. 2014. Kjemisk testing av valolje og sammenligning med tidligere produkt av spekk. NIFES. Norway. 27pp.
Víkingsson, G.A. 2015. Decadal changes in distribution, abundance and feeding ecology of baleen whales in Icelandic and adjacent waters – A consequence of climate change? Dissertation for the degree of Doctor Philosophiae. Faculty of Biosciences, Fisheries and economics, Department of Arctic and Marine Biology. University of Tromsø, Norway. 54pp + associated publications.
Víkingsson, G.A., Pike, D.G., Valdimarsson, H., et al. 2015. Distribution, abundance, and feeding ecology of baleen whales in Icelandic waters: have recent environmental changes had an effect? Frontiers in Ecology and Evolution 3:6. 18pp.
WEF [Word Economic Forum]. 2008. The Global Risks Report 2008. 54pp. available at www.stat.berkeley.edu/~aldous/157/Papers/WEF_GlobalRisks_Report_2008.pdf
WEF [Word Economic Forum]. 2012. The Global Risks Report 2012. 7th Edition. 62pp. available at http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2012.pdf
WEF [Word Economic Forum]. 2016. The Global Risks Report 2016. 11th Edition. 98pp. available at http://wef.ch/risks2016.
Weihe, P. and Joensen, H. D. F.2012. Dietary recommendations regarding pilot whale meat and blubber in the Faroe Islands. Int J Circumpolar Health 71:18594
Wenzel, G. 1992. Animal rights, human rights. Ecology, economy and ideology in the Canadian Arctic. University of Toronto Press. 206pp.
Wiig, O., Derocher, A.E., Cronin, M.M. and Skaare, J.U. 1998. Female pseudohermaphrodite polar bears at Svalbard. J Wildl Dis. 34(4):792-6.
WWF. 2013. Seals in Greenland - An important component of culture and economy. The Last Ice Area Project. WWF DK. 44pp. Available at: http://awsassets.wwfdk.panda.org/downloads/seals_in_greenland__wwf_report__dec_2013.pdf
WWF. 2015. All hands on deck: Setting course towards a sustainable blue economy. Retrieved from

http://www.wwf.se/source.php/1605622/15-6802%20All%20Hands%20on%20Deck_LR_151008.pdf
Ziegler, F., Nilsson, K., Levermann, N., Dorph, M., Lyberth, B., Jessen, A.A., Desportes, G. Local Seal or Imported Meat? Sustainability Evaluation of Food Choices in Greenland, Based on Life Cycle Assessment. Foods 2021, 10, 1194. https://doi.org/10.3390/foods10061194

APPENDICES (Appendices 1, 2, 3 and 4 were updated in August 2021)

Appendix 1. Abundance of seals and walrus in the NAMMCO area, trends in abundance, type of removals and average yearly catches in 2015-2019.
Appendix 2. Abundance of cetaceans in the NAMMCO area, trends in abundance, type of removals and average yearly catches in 2015-2019.
Appendix 3. Overview of management measures for marine mammals in NAMMCO countries, including references to the relevant legal instruments.
Appendix 4. Description of marine mammal hunting activities in NAMMCO countries, including relevant legislations and associated monitoring schemes.
Appendix 5. The right to marine mammal resources, also a question of indigenous peoples' rights

Appendices

(Appendices 1, 2, 3 and 4 were updated in August 2021)

Minke whale taken on board a Norwegian whaling vessel during the hunting season 2006.
© fiskeri.no/H.P.Tysnes

APPENDIX 1

Abundance of seals in the NAMMCO area, trends in abundance, type of removals and average catches in 2015-2019 (updated 25082021)

Legends:

In blue: stock component of the above stock

*** Most recent Abundance Estimate**

>> in front an overall population estimate indicates the estimate is minimal because some stocks are not included.

** Minimum estimate

† Trend - determined by the assessment:

When trends are given in parenthesis, they are reported by the authors, but not confirmed through an assessment.

When the assessment has been conducted in the IUCN, the IUCN listing is given in []

For harp and hooded seals, the assessments are conducted by the ICES/NAFO/NAMMCO (previously ICES/NAFO) Working Group on harp and hooded seals (WGHARP)

‡ Types and size of Removals

DC, direct; DCQ, with quota; BC, By-catch; SC, Scientific; SL, Struck and lost

Struck and Lost are only indicated when they are known to be substantial

CA, Canada; FO, Faroe Islands; GL, Greenland; EGL, East Greenland; WGL, West Greenland; IS, Iceland; NO, Norway.

§ In Iceland, special hunting permission can be granted for subsistence purposes

References:

Kovacs, K.M. 2016. *Erignathus barbatus*. The IUCN Red List of Threatened Species 2016: e.T8010A45225428.

Kovacs, K.M., Aars, J. and Lydersen, C. 2014. Walruses recovering after 60 Years of protection in Svalbard, Norway. Polar Research 33.

Krafft, B. A., Kovacs, K. M., Andersen, M. et al. 2006. Abundance of ringed seals (*Pusa hispida*) in the fjords of Spitsbergen, Svalbard, during the peak molting period. Marine Mammal Science 22:394-412.

Laidre, K., Stern, H., Kovacs, K.M., Lowry, L., Moore, S.E., Regehr, E.V., Ferguson, S.H., Wiig, Ø., Boveng, P., Angliss, R.P., Born, E.W., Litovka, D., Quakenbush, L., Lydersen, C., Vongraven, D. and Ugarte, F. 2015. Arctic marine mammal population status, sea ice habitat loss, and conservation recommendations for the 21st century. Conservation Biology 29(3): 394-737.

Merkel, B., Lydersen, C., Yoccoz, N.G., Kovacs, K.M. 2013. The World's Northernmost Harbour Seal Population – How Many Are There? PLoS ONE 8(7): e67576.

Mikkelsen, B. 2010. A note on the harbour seal (*Phoca vitulina*) in the Faroe Islands. NAMMCO Scientific Publication 8. 143-146.

Miller, G.W., Davis, R.A. and Finley, K.J. 1982. Ringed seals in the Baffin Bay region: habitat use, population dynamics and harvest levels. Report for Arctic Pilot Project, LGL Ltd, Toronto. 94pp.

[MOSJ] Environmental Monitoring of Svalbard and Jan Mayen. Walrus update. available at https://www.mosj.no/en/fauna/marine/walrus-population.html.

NAMMCO 1996. Report of the NAMMCO Working Group on Ringed Seals. NAMMCO Annual Report 1996. available at nammco.no

NAMMCO 2016. Report of the NAMMCO Coastal Seal Working Group. March 2016, Reykjavík, Iceland. available at nammco.no
NAMMCO 2018. Report of the NAMMCO Scientific Working Group on Walrus. October 2018, Copenhagen, Denmark. available at nammco.no
NAMMCO 2021. Report of the NAMMCO Coastal Seal Working Group. January 2021, online. available at nammco.no
Ognetov, G.N. 2002. Estimate of the ringed seal abundance in the White, Barents, and Kara seas. *In* V.M. Belkovich (Ed). Marine Mammals of the Holarctic. 2002. Abstracts of Reports, Baikal, Russia. Marine Mammal Council, p.209-210.
Rosing-Asvid, A. 2010. Seals of Greenland. Nuuk: Ilinniusiorfik Under- visningsmiddelforlag
Øigård, T.A., Frie, A.K., Nilssen, K.T., and Hammill, M.O. 2012. Modelling the abundance of grey seals (*Halichoerus grypus*) along the Norwegian coast. ICES Journal of Marine Science, 69: 1436–1447.

Species	Regions - Management Areas // Sub-areas of direct relevance to NAMMCO *Sub-units in blue are a component of the above Subarea.*	Most recent Abundance Estimate*	95% Confidence Interval	Date of last survey	Date latest Assessment NAMMCO [Other body]	Trend determined by the assessment†	Removals (Country)‡ DC, direct; DCQ, with quota; BC, By-catch; SC, Scientific; SL, Struck and lost#	Size of Annual Removals mean for years 2015-2019	References Abundance Estimate // Assessment
Harp seal	**North Atlantic**								
	Northwest Atlantic	7,445,000	6,426,000-8,354,000	2012	2014	Stable	DCQ (CA), DC (GL), BC, SL	GL: **50,857**	Both: ICES 2014
	Greenland Sea (West Ice)	426,808	313,005-540,612	2019 (model estimate)	2019	Increasing?	DCQ (NO), DC (GL)	NO: **2,839** GL: **1,515**	Both: ICES 2019
	White & Barents Sea (East ice)	1,497,189	1,292,939-1,701,440	2019 (model estimate)	2019	Unknown	DCQ (NO), P (RU)	NO: **574.4**	Both: ICES 2019
Hooded seal	**North Atlantic**								
	Northwest Atlantic	592,100	404,400-779,800	2005	2006	Increasing	DCQ (CA), DC (GL), SL, BC	GL: **1,406**	Both: ICES 2006
	Greenland Sea (West Ice)	76,623	58,299-94,947	2019 (model estimate)	2019	Decreasing	SC (NO), DC (GL)	NO: **17** GL: **123.6**	Both: ICES 2019
Ringed seal	**Arctic**	**>> 2,900,000**			**[IUCN 2014]**	**[Unknown, LC]**			**Laidre et al 2015 // Boveng 2016**
	Labrador	Unknown			1996		DC (CA+GL)		// NAMMCO 1996
	Baffin Bay - Davis Strait (incl. West Greenland) *Part of Baffin Bay* *West Greenland (fast ice)*	ca. 1,200,000 *787,000* *185,000*	(estimate from polar bears consumption)	1980s *Late 1970s* *Late 1970s*	1996	Unknown	DC (CA+GL)	GL: **40,211**	Kingsley 1998 // NAMMCO 1996 *Finley et al 1983* *Miller et al 1982*
	Southwest Greenland	Unknown			1996	Unknown	DC (GL)	GL: **7,205.6**	// NAMMCO 1996
	East Greenland *Scoresbysund and Kong Oscars Fjords*	Unknown *30,000*		*1984*	1996	Unknown *Single estimate*	DC (GL)		// NAMMCO 1996 *Born et al 1998*
	Svalbard *Spitsbergen*	Unknown *7,585***	*6,332-9,085*	*2003*	1996	Unknown *Single estimate*	DC (NO)	NO: **55.2**	// NAMMCO 1996 *Krafft et al 2006*
	Barents & Kara seas (from East Svalbard) *Kara sea*	Unknown *150,000*		*1994*	1996	Unknown *Single estimate*	DC (RU) *DC*		// NAMMCO 1996 *Ognetov 2002*
Bearded seal	**Arctic**	**Unknown**			**[IUCN 2016]**	**[Unknown, LC]**			**Kovacs 2016**
	West Greenland *"North Water"*	ca. 250,000 *6,005*	*4,070-8,858*	*2014*		*Single abund. estimate*	DC (GL)	WGL: **875**	GINR 2016 *Heide Jørgensen et al 2016*
	Southwest and east Greenland	Unknown					DC (GL)	EGL: **353**	
	Svalbard and Barents sea *Svalbard*	Unknown *Unknown, 1,000s*					*DC (NO)*	*NO: **21***	

Walrus	**Arctic**								
	Baffin Bay				2018	Increasing (from 2007)	DCQ (CA+GL), SL		Both: NAMMCO 2018
	Greenland - North Water	*1,279*	*938 - 1744*	*2018*	*2018*		*DCQ (GL), SL*	*GL: **60.2***	
	West Greenland-Southeast Baffin Island	Unknown				Increasing (from 2007)	DCQ (CA+GL), SL		Both: NAMMCO 2018
	West Greenland aggregation	*1,408*	*922-2,150*	*2012*	*2018*		*DCQ (GL), SL*	*GL: **51***	
	East Greenland	279	226-345	2017	2018	Stable/Increasing	DCQ (GL), SL	*GL: **6.6***	Both: NAMMCO 2018
	Svalbard / Franz Joseph Land	Unknown					Protected		*Kovacs et al 2014, MOSJ 2019*
	Svalbard	*5,503*	*5,031-6,036*	*2018*		*(Increasing)*	*Protected 1952*		
Grey seal	**North East Atlantic coastal**								
	Greenland	New species, 2009					Protected 2010		Rosing-Asvid 2010
	Iceland	6,269	5,375–7,181	2017	2016	Decreasing?	Protected[§] 2019, BC	IS: **35.6**	Granquist & Hauksson 2019 // NAMMCO 2016
	Faroe Islands	550**		2018-19	2021	Unknown	Protected 2020, BC	FO: **90.4** (Voluntary reporting from 2014)	NAMMCO 2021
	Norway (total)	3,850	3,504-4,196	2016	2016	Decreasing overall from 2011 (but only locally)	DCQ, BC	NO: **64**	Øigård et al 2012 // NAMMCO 2016
	Trøndelag -Nordland	*Pup production: 332*		*2014-15*	*2016*	*60% decline in pup production*	*DCQ, BC*	*NO: (Trøndelag - Nordland quota = 0 from 2015)*	*NAMMCO 2016*
Harbour seal	**North Atlantic Coastal**								
	GL / West Greenland (7 tentative management areas)				2021	Severely depleted, no sign of recovery	Protected 2010, BC	WGL: **7 in 2015-16 then 0**	NAMMCO 2021
	GL / South-Southeast (2 tentative management areas)								
	Iceland	9,434**	6,149-12,726	2018	2016	Decreasing until 2014	Protected[§] 2019, BC	IS: **82.6**	NAMMCO 2016
	Faroe Islands	Extirpated ~ 1850							Mikkelsen 2010
	NO / Total (Counties used as management areas, in total 10)	5,787** (not incl. Finnmark)		2016-20	2021	Decreasing overal (but only locally)	DCQ (NO), BC	NO: **366**	NAMMCO 2021
	Svalbard	1812**	1,656–4,418	2010			Protected		Merkel et al 2013

APPENDIX 2

Abundance of cetacean species in the NAMMCO area, trends in abundance, type of removals and average catches in 2015-2019 (updated 25082021)

Legends:

Most recent Abundance Estimate - with bias correction (when calculated):

Abundance estimates which are not corrected for perception bias (p) and availability (a) bias are de facto minimum estimates, as they are not corrected for (p) animals missed by the observers nor (a) because they are below the surface when the ship passes.

>> in front an overall population estimate indicates the estimate is minimal because some stocks are not included.

> in front of a stock estimate indicates that groups of animals were spotted at the edge of the survey area, thus indicated that the survey area did not achieve a complete coverage of the stock area and animals were present beyond the survey area.

§ Trend - determined by the assessment:

When trends are given in parenthesis, they are reported by the authors, but not confirmed through an assessment.

When the assessment has been conducted in the IUCN, the IUCN listing is given in []

*** Types and size of Removals**

DC&DCQ include Struck and Lost. BC, By-catch, is only mentioned for the harbour porpoise for which it is known to be substantial

CA, Canada; FO, Faroe Islands; GL, Greenland; EGL, East Greenland; WGL, West Greenland; IS, Iceland; NO, Norway.

References:

Boertmann, D., Blockley, D. and Mosbech, A. 2020. Greenland Sea - an updated strategic environmental impact assessment of petroleum activities Scientific Report from DCE - Danish Centre for Environment and Energy No. 375, 380 pp. https://dce2.au.dk/pub/SR375.pdf

Braulik, G. 2019. *Lagenorhynchus acutus*. The IUCN Red List of Threatened Species 2019: e.T11141A50361160

Braulik, G., Minton, G., Amano, M. and Bjørge, A. 2020. *Phocoena phocoena*. The IUCN Red List of Threatened Species 2020: e.T17027A50369903.

Cattanach, K.L., Sigurjonsson, J., Buckland, J. and Gunnlaugsson, T. 1993. Sei whale abundance in the North Atlantic, estimated from NASS-87 and NASS-89 data. Reports of the International Whaling Commission 43: 315-321.

Cooke, J.G. & Reeves, R. 2018. Balaena mysticetus. The IUCN Red List of Threatened Species 2018: e.T2467A50347659.

Cooke, J.G. 2018a. *Balaenoptera musculus*. The IUCN Red List of Threatened Species 2018: e.T2477A50226195.

Cooke, J.G. 2018b. *Balaenoptera borealis*. The IUCN Red List of Threatened Species 2018: e.T2475A130482064.

Doniol-Valcroze, T. et al. 2015. Abundance estimates of narwhal stocks in the Canadian High Arctic in 2013. DFO Can Sci Advis Sec Res Doc 2015/060: v + 36 p.

Doniol-Valcroze, T., Gosselin, J.-F., Pike, D.G., Lawson, J.W., Asselin, N.C., Hedges, K.J. and Ferguson, S.H. 2020. Distribution and Abundance of the Eastern Canada – West Greenland bowhead whale population based on the 2013 High Arctic Cetacean Survey. NAMMCO Scientific Publications 11.

Gilles, A., Gunnlaugsson, Th., Mikkelsen, B., Pike, D.G. and Víkingsson, G. 2020. Summer Abundance of Harbour Porpoises (*Phocoena phocoena*) in the Coastal Waters of Iceland and the Faroe Islands. NAMMCO Scientific Publications 11.

Hammond, P, Lacey, C., Gilles, A. et al. 2017. Estimates of cetacean abundance in European Atlantic shelf waters in summer 2016 from the SCANS III - aerial and shipboard surveys. https://synergy.st-andrews.ac.uk/scans3/files/2017/04/SCANS-III-design-based-estimates-2017-04-28-final.pdf

Hansen, R.G., Boye, T.K., Larsen, R.S., Nielsen, N.H., Tervo, O., Nielsen, R.D., Rasmussen, M.H., Sinding, M.H.S. and Heide-Jørgensen, M.-P. 2018a. Abundance of Whales in West and East Greenland in Summer 2015. NAMMCO Scientific Publications 11.

Heide-Jørgensen, M.P., Hansen, R.G., Fossette, S., Nielsen, N.H., Borchers, D.L., Stern, H. and Witting, L. 2016a. Rebuilding beluga stocks in West Greenland. Animal Conservation 20, 282–293.
ICES. 1996. Report of the Study Group on Long-Finned Pilot Whales. 22-26 April 1996. Cambridge, UK,
Innes, S., Heide-Jørgensen, M.P., Laake, J. et al. 2002. Surveys of belugas and narwhals in the Canadian high Arctic in 1996. NAMMCO Sci. Publ. 4, 169–190.
Kiszka, J. and Braulik, G. 2018a. *Lagenorhynchus albirostris*. The IUCN Red List of Threatened Species 2018: e.T11142A50361346.
Kiszka, J. and Braulik, G. 2018b. Grampus griseus. The IUCN Red List of Threatened Species 2018: e.T9461A50356660.
Leonard, D. and Øien, N. 2020. Estimated Abundances of Cetacean Species in the Northeast Atlantic from Norwegian Shipboard Surveys Conducted in 2014–2018. NAMMCO Scientific Publications 11.
Macleod, K., Burt, L., Cañadas, A., Lens, S., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O., Vázquez, J. A. and Hammond, P. S. 2009. Distribution and abundance of fin whales and other baleen whales in the European Atlantic. IWC Scientific Committee Document SC/61/RMP10.
NAMMCO 1993. Report of the 2nd Meeting of the NAMMCO Scientific Committee. available at nammco.no. available at nammco.no
NAMMCO 1995. Report of the 3d Meeting of the NAMMCO Scientific Committee. available at nammco.no
NAMMCO 1997. Report of the 5th Meeting of the NAMMCO Scientific Committee. available at nammco.no
NAMMCO 2017a. Report of the Scientific Committee Working Group on Assessment. Available at nammco.no
NAMMCO 2018a. Report of the NAMMCO Global Review of Monodontids, 13-16 March, Denmark. Available at NAMMCO.no
NAMMCO 2018b. Report of the Scientific Committee Working Group on Abundance Estimate Available at nammco.no
NAMMCO 2019a. Report of the 26th Meeting of the NAMMCO Scientific Committee. available at nammco.no
NAMMCO 2019b Report of the NAMMCO Working Group on Narwhals in East Greenland. Available at nammco.org
NAMMCO 2020. Report of the NAMMCO–JCNB Joint Working Group on Narwhal and Beluga. Available at NAMMCO.no
Pike, D.G., Gunnlaugsson, T., Mikkelsen, B., Halldórsson, S.D. and Víkingsson, G.A. 2019a. Estimates of the abundance of cetacean in the central North Atlantic based on the NASS Icelandic and Faroese shipboard surveys conducted in 2015. NAMMCO Scientific Publication 11.
Pike, D.G., Gunnlaugsson, T., Desportes, G., Mikkelsen, B., Víkingsson. G.A. and Bloch, D. 2019b. Estimates of the relative abundance of long-finned pilot whales (*Globicephala melas*) in the Northeast Atlantic from 1987 to 2015 indicate no long-term trends. NAMMCO Scientific Publications 11.
Pike, D.G., Gunnlaugsson, T., Sigurjónsson, J. and Víkingsson, G.A. 2020. Distribution and abundance of cetaceans in Iceland Waters over 30 Years of Aerial Surveys. NAMMCO Scientific Publication 11.
Rekdal, S.L., Hansen, R.G., Borchers, D., Bachmann, L., Laidre, K.L., Wiig, Ø., Nielsen, N.H., Fossette, S., Tervo, O. and Heide-Jørgensen, M.P. 2015. Trends in bowhead whales in West Greenland: Aerial surveys vs. genetic capture-recapture analyses. Marine Mammal Science, 31: 133-154.
Solvang, H.K., Skaug, H.J. and Øien, N.I. 2015. Abundance estimates of common minke whales in the Northeast Atlantic based on survey data collected over the period 2008-2013. SC/66a/RMP8, IWC Scientific Committee, May 2015.
Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P. and Pitman, R.L. 2019. Physeter macrocephalus (amended version of 2008 assessment). The IUCN Red List of Threatened Species 2019: e.T41755A160983555.
Vacquie-Garcia, J., Lydersen, C., Marques, T.A. et al. 2017. Late summer distribution and abundance of ice-associated whales in the Norwegian High Arctic. doi: 10.3354/esr00791
Wells, R.S., Natoli, A. and Braulik, G. 2019. *Tursiops truncatus* (errata version published in 2019). The IUCN Red List of Threatened Species 2019: e.T22563A156932432.

Species	Bassin// Regions - Management Areas//Sub-areas of direct relevance to NAMMCO. *Sub-units in blue are a component of the above Subarea.*	Most recent Abundance Estimate (bias correction#)	95% Confidence Interval (or CV)	Date Survey	Date latest Assessment: NAMMCO [Other body]	Trend determined by the assessment§	Removals* (Country)* DC, direct; DCQ, with quota; BC, By-catch	Size of Annual Removals* (mean for years 2015-2019)	References Abundance Estimate // Assessment
Bowhead whale	**Arctic**	**>> 25,000**			**[IUCN 2018]**	**[Increasing, LC]**			**Cooke and Reeves 2018**
	Baffin Bay - Davis Strait	6,446 p,a	3,838-10,827	2013		(Increasing)	DCQ (CA+GL)		Doniol-Valcroze et al 2020
	"WGL winter component"	*744 a* *1,538*	*357-1,461* *827-2,249*	*2012* *Genetic*		*(Increasing until 2006, stable since)*	*DCQ*	*GL: **0.2***	*Rekdal et al 2015*
	Spitsbergen	Unknown					Protected		
	NEGL	*318ab*	*110-956*	*2017*					*Hansen et al 2018b*
	NE Water Polynya	*301ab*	*127-769*	*2017*		*(Increasing)*			*Boertmann et al 2020*
	Svalbard North	*343 a*	*136-862*	*2015*		*(Increasing)*			*Vacquie-Garcia et al 2017*
Blue whale	**North Atlantic**	**Unknown**			**[IUCN 2018]**	**[Increasing, EN]**	**Protected**		**Cooke 2018a**
	Western North Atlantic	Unknown							
	Eastern North Atlantic	Unknown							
	Iceland - Faroes	*3,000 p*	*1,377-6,534*	*2015*		*(Increasing)*			*Pike et al 2019a*
Fin Whale	**North Atlantic Bassin**	**>> 79,000**	**CV=0.13**	**2015**	**[IUCN 2018]**	**[Increasing, VU]**			**Cooke 2018b**
	Western North Atlantic								
	West Greenland	2,215 p,a	1,017-4,823	2015	[IWC 2018]	Decreasing	DCQ	GL: **9**	Hansen et al 2018a / NAMMCO 2017a
	Central North Atlantic								
	East Greenland Coastal	6,440 p,a	3,901-10,632	2015		Single estimate	Protected		Hansen et al 2018a
	East Greenland - West Iceland	36,773 p	25,811-52,392	2015	2017	Increasing	DCQ	IS: **60.2**	Pike et al 2019a / NAMMCO 2017a
	East Iceland - Faroes (EI+F)						No catch		
	Eastern North Atlantic								
	Norwegian and Barents Seas (N+W)	11,387 p	8,072-16,063	2014-2018		(Stable)	Protected		Leonard & Øien 2020
Humpback whale	**North Atlantic**	**>> 15,000**		**2007**					**NAMMCO 2011**
	West Greenland	993 p,a	578-3,022	2015	[IWC 2018]	Decreasing or distributional shift	DCQ	GL: **4.6**	Hansen et al 2018a / NAMMCO 2017a
	East Greenland coastal	4,223 p,a	1,845-9,666	2015		Single estimate	Protected		Hansen et al 2018a
	Iceland - Faroes	9,867 p	4,854-20,058	2015		(Stable)			Pike et al 2019a
	Barents and Norwegian Sea	10,708 p	4,906-23,370	2014-2018		(Stable)			Leonard & Øien 2020

Sei whale	**North Atlantic**	**>> 10,000**			**[IUCN 2018]**	**Increasing [EN]**	**Protected**		**Cooke 2018b**
	West Greenland	tfs							
	Iceland-Denmark Strait (Central NA)	> 10,300	CV=0.27	1987-89					Cattanach et al 1993
	Iceland -Faroes	*3,767 p*	*1,156-12,270*	*2015*	*2018*	*Unknown*			*Pike et al 2019a*
	Eastern NA (FO, NO, UK, SP)	European Atlantic: 366	CV=0.33	2007		Unknown			Macleod et al 2009
Minke whale	**Western North Atlantic**								
	West Greenland	5,095 p,a	2,171-11,961	2015	[IWC 2018]	(Decreasing)	DCQ	GL: **138**	Hansen et al 2018a
	Central North Atlantic								
	East Greenland	2,762 p,a	1,160-6,574	2015	[IWC 2018]	Single estimate	DCQ	GL: **8.8**	Hansen et al 2018a
	Iceland coastal (CIC)	13,497 p,a	5,377-33,882	2016	2017	Decreasing after 2001 and/or north &	DCQ	IS: **19.6**	Pike et al 2020a / NAMMCO 2017a
	Iceland Pelagic (Iceland-Faroes)	42,515 p	22,896-78,942	2015		(Stable)	No catch		*Pike et al 2019b*
	Eastern North Atlantic								
	Svalbard-Bear Island West (ES)								
	Eastern Barents Sea (EB)	**100,615 p,a**	**81,154-124,743**	**2008-13**	**[NO 2019]**	**Stable**	**DCQ**	**NO: 513.2**	**Solvang et al 2015**
	Eastern Norwegian Sea (EW)								
	North Sea/West UK								
Sperm whale	**North Atlantic**	**Unknown**			**[IUCN 2008]**	**Unknown [VU]**			**Taylor et al 2019**
	Iceland - Faroes	*23,166 p*	*7,699-69,709*	*2015*		*(Increasing)*	**Protected**		*Pike et al 2019a*
	Norway	*5,704 p*	*3,374-9,643*	*2014-2018*		*(Stable)*			*Leonard & Øien 2020*
Bottlenose whale	**North East Atlantic**	**~40,000 a**		**1987-89**	**1995**	**Single estimate**	**DC**	GL: 6	**NAMMCO 1995**
	Iceland - Faroes	*19,975*	*5,562-71,737*	*2015*		*(Stable)*	FO: Live strandings	FO: **1.8**	Pike et al 2019a
	Norway	*7,800*	*4,373-13,913*	*2014-18*		*Single estimate*	Protected		Leonard & Øien 2020
Beluga	**Eastern high Arctic-Baffin Bay**	**21,213**	**10,985-32,619**	**1996**		**Likely stable**	**DC (CA), DCQ (GL)**		**Innes et al 2002 // NAMMCO 2018a**
	North Water + West Greenland								
	North Water (Winter)	*2,063 p,a*	*513-8,289*	*2018*	*2020*	*Increasing*	*DCQ*	*GL: **12***	*NAMMCO 2020 // NAMMCO 2020*
	West Greenland (Winter)	*9,072 p,a*	*4,895-16,450*	*2012*	*2020*	*Increasing*	*DCQ*	*GL: **188.4***	*Heide-Jørgensen et al 2016 // NAMMCO 2020*
	Southwest Greenland	Extirpated ~1930							NAMMCO 2018a
	Svalbard - Barents Sea								
	Svalbard	549	436-723	2018		Single estimate	Protected		Vacquié-Garcia et al. 2020

Marine Mammals: A multifaceted Resource

"Feeding Bodies and Souls"

Narwhal	**Baffin Bay**	Baffin Bay narwhals are composed of the 8 stocks below, or summer aggregations, that migrate between Canada and Greeenland and are susceptible to hunting by both CA and GL hunters							
	Smith Sound (Western part, Summer)	16,360 p,a	3,833-69,836	2013	2017	Unknown	DCQ (CA+GL)		Doniol-Valcroze et al 2015 // NAMMCO 2018a
	Eastern North Water, Winter	*2,268 p,a*	*753-6830*	*2018*			*DCQ (GL)*	GL: **108.2**	*NAMMCO 2020*
	Jones sound (Summer)	12,694 p,a	6,324-25,481	2013	2017	Unknown	DCQ (CA)		Doniol-Valcroze et al 2015 // NAMMCO 2018a
	Inglefield Bredning	2,874 p,a	1,928-4,354	2019	2017	Stable	DCQ (CA+GL)		NAMMCO 2020 // 2018a
	Melville Bay	4,755 p,a	1,158-20,066	2019	2017	Stable	DCQ (CA+GL)	GL: **85**	NAMMCO 2020 // 2018a
	Eastern Baffin island (Summer)	17,555 p,a	8,473-36,373	2013	2017	Likely stable	DCQ (CA)		Doniol-Valcroze et al 2015 // NAMMCO 2018a
	Eclipse Sound	12,039 a	7,768-18,660	2016	2017	Unknown	DCQ (CA+GL)		NAMMCO 2020 // NAMMCO 2018a
	Admiralty Inlet (Summer)	35,043 p,a	14,188-86,553	2013	2017	Stable	DCQ (CA+GL)	GL: **252,8**	Doniol-Valcroze et al 2015 // NAMMCO 2018a
	Somerset Island (Summer)	49,758 p,a	32,945-75,182	2013	2017	Possibly increasing	DCQ (CA+GL)		Doniol-Valcroze et al 2015 // NAMMCO 2018a
	East Greenland								
	Northeast Greenland (North of Ittoqqortoormiit to Norøstrundingen)					Unknown	Protected (Northeast Greenland National Park)		
	NEW (Summer)	*47 p,a*	*16-148*	*2017*		*Single estimate*			
	Greenland Sea (Summer)	*2,908 p,a*	*1,639-5,168*	*2017*		*Single estimate*			*Hansen et al 2019*
	Dove Bay (Summer)	*2,297 p,a*	*1,123-4,745*	*2017*					
	Ittoqqortoormiit / Scoresby Sound / Bosseville Coast to 68.30N	433 p,a	CV=0.49	2016	2017	Decreasing	DCQ	GL: **83**	NAMMCO 2019b // NAMMCO 2018a, 2019b
	Kangerlussaq (68.30N - 67N)	269 p,a	CV=0.37	2016		Decreasing			
	Tasiilaq (South of 67N)	206 p,a	CV=0.55	2008		Decreasing			
	Svalbard - Barents Sea								
	Svalbard	837 a	314-2233	2015		Single estimate	Protected		Vacquie-Garcia et al. 2017
Killer whale	**North Atlantic**								
	West Greenland	tfs					DC	WGL: **9.4**	
	Central and North East Atlantic						DC		
	East Greenland	*tfs*					*DC*	*EGL: **9.2***	
	Iceland-Faroe Islands-Norway	*22,100*	*15,282-32,023*	*2015*	*1993*	*(Unknown)*	*Protected*		*Pike et al 2020 // NAMMCO 1993*
Pilot whale	**North Atlantic**	**>> 500,000**		**recent**	**[ICES 1996] 1997**		**DC**		**Pike et al 2019b // ICES 1996, NAMMCO 1997**
	West Greenland	> 9,190 p,a	3,635-23,234	2015		(Stable)	DC	GL: **228.2**	Hansen et al 2018a
	East Greenland	258 p,a	65-1,749	2015		Single estimate	DC	GL: **79.6**	Hansen et al 2018a
	Iceland - Faroe Islands	344,148 p	162,795-727,527	2015		(Stable)	DC (FO)	FO: **661**	Pike et al 2019ab
	Norway	tfs					Protected		

Lagenorhynchus spp.	*West Greenland*						*DC*	*GL:* ***93.4***	
	East Greenland						*DC*	*GL:* ***43.2***	
	Norway	*187,482 p*	*112,434 - 312,624*	*2014-2018*			*Protected*		*Leonard & Øien 2020*
White-beaked dolphin	**North Atlantic**	**>> 300,000**			**[IUCN] 2018**	**Unknown [LC]**	**DC**		**Pike et al 2019a // Kiszka & Braulik 2018a**
	Greenland *West Greenland* *East Greenland*	 *15,261 p,a* *11,899*	 *7,048-33,046* *4,710-30,008*	 *2015* *2015*		 *(Decreasing)* *Single estimate*	DC	*GL: na (recorded as Lagenorhynchus spp.)*	*Hansen et al 2018a*
	Iceland - Faroe Islands *Iceland Coastal*	159,000 p *59,966 p*	49,957-506,054 *24,907-144,377*	2015 *2016*		(Increasing) *(Increasing)*	No catch		Pike et al 2019a *Pike et al 2020*
	Norway	See *Lagenorhynchus*					Protected		
White-sided dolphin	**North Atlantic**	**>> 200,000**			**[IUCN 2019]**	**Unknown [LC]**	**DC**		**Pike et al 2019a // Braulik 2019**
	Greenland	Unknown					DC	*GL: na (recorded as Lagenorhynchus spp.)*	
	Iceland - Faroe Islands	131,022 p	35,251 - 486,981	2015		(Increasing)	DC	FO: **150.4** (no catch in 2015-16)	Pike et al 2019a
	Norway	See *Lagenorhynchus*					Protected		
Bottlenose dolphin	**Eastern N Atlantic**	**Unknown**			**[IUCN 2018]**	**Unknown [LC]**	**DC**		**Wells et al 2019**
	Faroe Islands	~1,000					DC	FO: **0**	
	Norway	Unknown					Protected		
Risso's dolphin	**Eastern North Atlantic**	**Unknown**			**[IUCN 2018]**	**Unknown [LC]**	**Protected**		**Kiszka & Braulik 2018b**
Harbour porpoise	**Eastern North Atlantic**				**[IUCN 2020]**	**Unknown [LC]**	**DC + BC**		**Braulik et al 2020**
	Greenland *West Greenland* *East Greenland*	 *106,822 p,a* *1,642 p,a*	 *55,149-206,909* *318-8,464*	 *2015* *2015*	*2019*	 *Increasing* *Single estimate*	 *DC* *DC*	 *GL:* ***2,482*** *EGL:* ***10,6***	*Hansen et al 2018a, NAMMCO 2019*
	Iceland	22,806 p	9,166-56,746	2016		(Decreasing/stable)	No catch	[IS: **BC: 1,000s**]	Pike et al 2019a
	Faroes	5,175 p,a	3,457-17,637	2010		Single estimate	DC	[FO: **BC & DC na**, low]	Gilles et al 2020
	Barents Sea - Lofoten Coastal Lofoten-62N North Sea (NILS 2014-2018)	*255,929 p*	*172,742-379,175*	*2014-2018*		(Stable)	Protected	[NO: **BC: 3,000s**]	Leonnard & Øien 2020
	North Sea (SCANS III)	345,373	246,526-495,752	2016		(Stable, but southward shift)		All: **BC=high, na**	Hammond et al 2017

APPENDIX 3

Overview of Management Measures for Marine Mammal Species in NAMMCO countries, and preferences to the relevant Legal Instruments (updated 25082021)

		Cetaceans		Seals and walruses	
	References	*Hunting allowed*	*Protected*	*Hunting allowed*	*Protected*
Faroes	http://www.logir.fo/Logtingslog/56-fra-19-05-2015-um-grind-og-annan-smahval Parliamentary Act No 56 of 19 May 2015 on Pilot Whales and Other Small Whales, most recently amended by Parliamentary Act No. 91 of 7 June 2020 https://www.whaling.fo/media/1053/grindakunnger%C3%B0in-2017-en.pdf Executive Order No 9 of 26 January 2017 on hunting Pilot Whales and other Small Whales https://logir.fo/Logtingslog/65-fra-14-05-2020-um-broyting-i-logtingslog-um-aling-av-fiski-vm Executive Order No 65 of 14 May 2020 on prohibition to kill any marine mammal around fish farms	Restrictions on areas, methods and size of local catch Long-finned pilot whale White-sided dolphin White-beaked dolphin Bottlenose dolphin Harbour porpoise	All other cetacean species All cetacean species around fish farms	None	Grey seals (the only resident species is de facto protected by a combination of regulations)
Greenland	http://lovgivning.gl/lov?rid={E0380274-B10B-4D74-A3C1-CFBFD9C62C00} Executive Order No 16 of 12 November 2010 on protection and hunting of seals http://lovgivning.gl/lov?rid={37A7FCF4-46A0-4B47-B42C-B8385F315D65} Executive Order No 20 of 27 October 2006 on walrus http://lovgivning.gl/lov?rid={A8582C7D-2F47-4B71-B0C1-BAFF5CBDACD1} Executive Order No 3 of 27 January 2017 on beluga and narwhal http://lovgivning.gl/lov?rid={D09EBA1A-6A0E-4745-980A-43E001D5194A} Executive Order No 9 of 6 December 2018 on large whales	West: Bowhead whale **(quota)** West: Fin whale **(quota)** West: Humpback whale **(quota)** Both West and East: Minke whale **(quota)** Both West and East: Narwhal **(quota)** West: Beluga **(quota)** Killer whale Pilot whale Bottlenose whale White-sided dolphin White-beaked dolphin Harbour porpoise	All other cetacean species and / or areas	Both West and East: Walrus (**quota**) Hooded seal Harp seal Ringed seal Bearded seal	Grey seal, Harbour seal For others seal species: - lactating females and pup pairs - pups with lanugo hair ('white-coats') – so in practice for harp, ringed, and bearded seals that are species with laguno hair.

		Cetaceans		**Seals and walruses**	
	References	*Hunting allowed*	*Protected*	*Hunting allowed*	*Protected*
Iceland	https://www.reglugerd.is/reglugerdir/allar/nr/163-1973 Regulation of whaling No 163 of 30 May 1973 with amendments https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/1100-2019 Regulation No 1100 of 11 December 2019 – general seal ban	Fin whale **(quota)** Minke whale **(quota)**	All other cetacean species	Permission can be requested for personal use: Grey seal Harbour seal (the only two resident species)	All – but see under allowed
Norway excl. Svalbard	The Ministry of Trade, Industry and Fisheries and the Directorate of Fisheries issue annual regulations relating to quotas, hunting period and areas for the hunting of minke whales, seals in the West Ice and East Ice, and coastal seals. For information on laws and regulation governing marine mammal hunts look here	Minke whale **(quota)**	All other cetacean species	**Pack ice hunt** Harp seal **(quota)** Hooded seal (**quota - since 2007 quota=0)** **Coastal stocks** Grey seal **(quota)** Harbour seal **(quota)** Permission can be granted during special time periods: Ringed seal Harp seal	Other seal species All seal species around fish farms
Svalbard	https://lovdata.no/dokument/SF/forskrift/2002-06-24-712#KAPITTEL_2 "Forskrift om høsting på Svalbard"	Minke whale (**quota)**	All other species	Only permitted outside breeding season in the following periods: Bearded seal: 01/02-27/04 + 05/06-30/11 Ringed seal 01/02-20/03 + 20/05 – 30/11	Walrus All seals other than bearded and ringed seals are fully protected During breeding season bearded and ringed seals are also protected

APPENDIX 4

Overview of marine mammal hunting methods and monitoring/observation in NAMMCO Member Countries (updated 25082021)

The overall aim for a successful hunt is to kill the animal instantaneously or as quick as possible in a manner that maximises hunter's safety and the efficiency of the hunt while minimizing animal suffering.

A prerequisite for responsible resource management is to have mechanisms to monitor the resources not only with respect to abundance and trends but also hunting methods and utilisation. In recognition of this, NAMMCO established an International Observation Scheme in 1998 and has since contracted observers to monitor hunting activities in member countries on an annual basis.

The current Observer Scheme came into force in 2019 and provide a mechanism for NAMMCO to oversee whether recommendations made by NAMMCO are implemented and national regulations are adhered to. It continues to ensure international transparency in whaling and sealing operations in the region.

1. FAROE ISLANDS

Whale hunting is subject to detailed regulations laid down by the Faroese Parliament and the Ministry of Fisheries. Seal hunting is not governed by any special legislation[1].

1.1 WHALES

Long-finned pilot whale, white-sided dolphin, white-beaked dolphin and bottlenose dolphin are the four whale species that can be hunted in the Faroe Islands as drive hunts. Harbour porpoises may be also hunted, by shooting them.

When a school of pilot whales or other small whales is sighted the district administrator has to be notified. The district administrator, in consultation with the whaling foremen, decides into which whaling bay the school shall be driven, according to the prevailing currents. A whaling bay has to fulfil certain criteria and there are presently 23 authorised whaling bays in the Faroes. Once the decision on location is made, the boats form a semi-circle behind the whales and stones are thrown into the water to make air bubbles, which help herd the whales in the desired direction. Upon approaching the whaling bay the boats are arranged by size. The smallest boats, which can get closest to the beach, are in the front row, while the larger boats are kept behind. In this manner, the school is beached or driven so close to the beach that people are able to wade out to the whales to secure them for killing.

The actual killing method has changed very little throughout history. The whale is secured with a blowhole hook, after which the spinal lance is positioned in the midline between the blowhole and the dorsal fin at one hand's breadth behind the blowhole and directed at an angle approximately 10 degrees backward. With a single thrust followed by sideways movements the spinal cord and the surrounding blood vessels are severed, directly followed by severing the jugulars and the carotids with a whaling knife so that the whale can be bled properly. Once the cut is made, the whale lies completely paralyzed and unconscious.

[1] Parliamentary Act No 56 of 19 May 2015 on pilot whales and other small whales, most recently amended by Parliamentary Act No 44 of 6 May 2016. Executive order No 100 of 5 July 2015 on pilot whale drive.

1.1.1 Training

New legislation was introduced in 2015 and hunters are now obliged to have received certification following an accredited course in pilot whaling to be entitled to kill whales. The course includes a review of the NAMMCO instruction manual on pilot whaling.

1.1.2 Monitoring

Monitoring and systematic reporting of the whale hunt takes place through the district administrator's report to the Ministry of Fisheries. For each drive hunt, information is reported about where and when the school of pilot whales was found, the whaling bay, total killing time, number of whales, size and sex, number of participating boats, number of hunters on shore and in boats and if there have been any violations of the regulations as well as appraisal, marking and sharing of the pilot whales.

If any harbour porpoises are hunted, hunters are obliged to report the number shot to the district administrators, who then report to the Ministry of Fisheries.

1.2 SEALS

The only seal species presently found in the Faroese is the grey seal. The species was not protected and was until new legislation came in 2020 intentionally killed in the Faroe Islands as nuisance animals around fish farms in the Faroese fjords. There was no specific legislation pertaining to the hunting of seals and they were previously shot with rifles. In 1969 new weapons legislation[2] banned the use of rifles as hunting weapons in the Faroes. However, in response to the complaints from fish farmers, permission to kill seals with rifles of minimum calibre 6.5 mm using hollow pointed bullets was granted. In 2020 a new Executive Order[3] came into force that prohibits all intentional killing of marine mammals around fish farms so in effect the grey seal is now protected in the Faroe Island.

1.2.1 Reporting

Fish farms are obliged to report the number of seals that are shot to the Ministry of Fisheries[4]. According to the weapon legislation, completion of a firearms training course and possession of a firearms license are required to be entitled to handle weapons.

2. GREENLAND

The responsibility for whaling and sealing lies with the Ministry of Fisheries, Hunting and Agriculture. They regulate and administer the hunts, while the Fisheries License Control Authority, through their wildlife officers, supervise and control the activities. The Ministry issues regulations that detail the scope and requirements for obtaining hunting permits, reporting requirements and sanctions. Large cetaceans, Narwhal and Beluga and walrus hunting are regulated by a quota system whereas other small cetaceans and seal hunting is not, though the municipality may set local regulations[5].

---

[2] No 43 of 22 May 1969 on weapons etc., as last amended by Parliamentary Act No 81 of 22 May 2015

[3] Executive order No 65 of 14 May 2020

[4] Executive order No 50 of 30 April 2018 on fish farming

[5] www.Lovgivning.gl – link to where all laws and regulations can be found online.

Greenland Home Rule Act	No 1 of 16 May 2008 on revisions to Greenland Home Rule Act No 12 of 29 October 1999 on hunting
	No 25 of 18 December 2003 on animal welfare
	No 29 of 18 December 2003 on nature protection
Executive Order	No 26 of 24 October 1997 on extraordinary check and approval of harpoon canons
	No 28 of 30 October 1998 on the tasks and authority of wildlife officers
	No 22 of 19 August 2002 on trophy-hunting and fishing
	No 20 of 27 October 2006 on protection and hunting of walrus
	No 12 of 16 July 2010 on reporting from hunting and strike of large whales

2.1 WHALES

Minke whales, fin whales, bowhead whales and humpback whales with harpoon gun

The hunt is opportunistic and seasonal, *i.e.* the hunters are not full-time whalers. Fin whales are caught either by two boats of a minimum length of 30 ft working together, or by one boat of a minimum length of 36 ft. One boat with a minimum length of 36 ft is required for the humpback whale. The bowhead is caught by three boats of a minimum length of 36 ft working together. The majority of minke whales are also taken by this method, by one boat with a length of 30-70 ft. Each boat must be equipped with one certified 50mm Kongsberg harpoon gun, which is checked every second year.

The primary hunting weapon is a harpoon with the Norwegian penthrite "Whale Grenade 99". This whale-grenade was produced for minke whales but has been modified to accommodate the hunt of the larger whales (the triggering cord being extended from 40 cm to 90 cm, and explosive increased from 30 g to 45 g of penthrite). Primary and secondary weapons for the three larger whale species are the modified "Whale Grenade 99". Gunners shoot the whale in the heart and lung region by aiming at an area close to the pectoral fins.

The secondary weapon for the minke whale is either a new grenade or rifle of a minimum calibre of 7.62 mm (30.06) employing full mantled bullets. Some hunters use solid round- nosed bullets together with rifles with higher calibre (.375), due to their better penetration. Rifle shots are aimed at the neck, in the back of the animal's head.

Hunting generally occurs in good sea conditions only (<Beaufort 3), as the main method of hunting is stealth. Trips generally last less than 24 hours and once a vessel has caught a whale it tows it to the nearest suitable flensing site. Hunting usually occurs within 60 nm of the home port of the vessel and depending on conditions up to 10 nm offshore.

2.1.1 Collective minke whale hunt

The collective minke whale hunt is carried out in settlements without harpoon gun boats. The collective minke whale hunt is the only hunt of large whales in areas with little infrastructure, such as East Greenland and West Greenland north of Disko Bay.

A minimum of five skiffs are required to carry out a hunt, but normally it will be around 8 -10 small (usually around 19 ft and never more than 29 ft) boats equipped with outboard motors. Each boat generally contains from 2-4 people. Boats of larger size without harpoon guns can also take part, but not as the leading boat. Each skiff shall be equipped with at least one hand harpoon with line and buoys. This harpoon is attached to the whale at the first opportunity, to prevent the animal from sinking. During the hunt, hunters attempt to herd the whale towards shallow and inshore waters.

The weapons used are rifles of a calibre of 7.62 mm. (30.06) or larger using full mantled bullets. As a rule, the whales are first wounded and then secured with the hand harpoons. When possible, the hand harpoon is used before wounding the animal. One hunter is the designated leader, and it is his task to secure the animal with the hand harpoon. Once a whale has been secured, it is killed by shots aimed

---

No 16 of 12 November 2010 on protection and hunting of seals

No 13 of 30 December 2014 on hunting licenses for full time hunters

No 14 of 30 December 2014 on hunting licenses for part-time hunters

No 3 of 27 January 2017 on protection and hunting of beluga and narwhal

No 9 of 6 December 2018 on protection and hunting of large whales

Catch registration form (1993-present) "*Piniarneq*"

at the neck. Round-nosed solid bullets together with rifles of higher calibre, such as .375, are often used to kill the whale.

2.1.2 Small whale hunts

Harbour porpoise, white-sided and white-beaked dolphins, long finned pilot whales, killer whales, narwhal and beluga are the small cetacean species that are hunted in Greenland. The hunting method is essentially similar for all the species; a collective hunt from small, open motorboats. The whales are shot with rifles with a minimum calibre of .30-06 and full metal jacket bullets (an exception is the smaller harbour porpoise where the recommended calibre is .222). The hunter aims at the thorax region which will kill the whale rapidly by hitting the heart, lungs or vertebrae. The shot ranges vary from 5 – 30 meters. After a successful shot the hunter secures the whale with a long shafted gaff hook (*ni*ss*ik*) before it sinks.

In the narwhal and beluga hunt which takes place in the open sea and ice-cracks, the whale will first be harpooned to attach floats to secure the whale before being shot. The desired target is the brain, but the neck and heart are also regarded as good target points. Harpoon hunts from qayaqs takes place close to the ice edge in North Greenland. Two hunters will often cooperate and when the whale is spotted from shore, they will very quietly embark the kayak. They will secure the whale with handheld harpoons and then shoot it using 30.06 or .375 calibre rifle with full metal jacket pointed ammunition. It is not a national requirement to secure the animals before shooting. However, some regional regulations recommend harpooning to secure the animal before killing it, and within the Melville Bay protected reserve this is a requirement.

In East and North Greenland, hunters are allowed to hunt with nets during the dark period of the year when there is no daylight. The nets are set in open water or under the sea-ice, and they are checked daily. An average of 20 whales are hunted by this method annually.

2.2 SEALS AND WALRUS

Six species of seal are found in the waters surrounding Greenland. These are harp seal, ringed seal, hooded seal, harbour seal, bearded seal and grey seal. Today, the focus of the hunt is on harp and ringed seals but also, to a much lesser extent, hooded seals. From 1 December 2010 the harbour seal and grey seal are completely protected pending biological advice indicating that the stocks are in a condition to be hunted. For all seal species lactating female and pup pairs and pups with lanugo hair (white-coats) are protected.

Hunting methods vary depending on season, region and species. The hunt for harp and hooded seals takes place all year around, but predominantly during summer and fall in open water. The hunter locates the seal and shoots it with a rifle. In northern Greenland, during the dark winter months, netting is the prevailing method used by hunters to catch ringed seals. The use of nets is a local small scale hunt compared to the traditional rifle hunt. In spring, when ringed seals haul-out on the ice, hunters use white screens to sneak up to an appropriate shooting distance and shoot the seal in the head.

No quotas are set for the Greenland seal hunt, because of the very large seal population and relatively small sustainable hunt. Hunters are required to report their catches to the Ministry on an annual basis. Seals can be hunted by all Greenlandic residents, provided they have either a full time or a part time hunting permit. The rifle is the most common weapon for seal hunting. The .30-06 calibre is common in some districts during the winter, while the calibres .17, .22 Mag., and .222 are the most common in the spring and summer hunts. There are no specific guidelines defining the types of rifles that can be used, however the ammunition used must have a muzzle energy E100 > 160 Joule, for shotgun the

minimum allowed calibre is 20. Some communities may have more restrictive local rules on transportation.

Walrus can only be killed by fulltime hunters with licenses issued by the municipality. The walrus is shot with rifles with a minimum calibre of .30-06 full metal jacket sharp point bullets. Full- and semi-automatic rifles are not allowed. It is mandatory to harpoon the animal before delivering the deadly shot to prevent it from sinking. The harpoon must have one or several attached floats. Sometimes the first shot will be a body shot with the aim of slowing down the animal before harpooning it. Walrus may only be hunted at sea, not on land.

2.3 TRAINING – WHALES, SEALS AND WALRUS

There are no formal training courses on how to shoot or where to aim at the animal in Greenland. Knowledge is passed on from generation to generation and between captain and crew. For whale hunts, there are courses on the handling and maintenance of harpoon grenades. Furthermore, the NAMMCO instruction manual on hunting of small cetaceans has been sent out to all hunters reporting a catch of a small cetacean in the last five years.

2.4 MONITORING AND INSPECTION SYSTEM – WHALES, SEALS AND WALRUS

The wildlife officers work in close cooperation with the municipality authority, the police, Arctic Command and the Government of Greenland. The wildlife officers monitor the whale, seal and walrus activity itself by inspections of some of the hunts at sea and / or by controlling permits, licenses and equipment used on-board the vessels and skiffs and at the open markets where the hunters can sell their products.

2.5 REPORTING SYSTEM – WHALES, SEALS AND WALRUS

The reporting system in Greenland is a self-reporting system where all catches are reported to the Ministry of Fisheries, Hunting and Agriculture. For every marine mammal taken under license the hunter or the responsible person (captain of the harpoon boat or the chosen leader in the collective hunt) is required to fill out a reporting form that is submitted to the Ministry shortly after the hunt.

The report includes information about the hunter, his license and boat, description of the weapon used to kill the animal, serial number of the grenade in the case of a large whale, etc. Furthermore, it gives information on species, catch area and different kinds of biological data depending on the species e.g. for large whales: flensing place, body length, sex, reproductive state of females, stomach contents, weight of editable products and estimated time to death (TTD). Cases of "struck and lost" are also reported.

Reporting requirements are based on the hunting act, and hunting and species executive orders. *Særmeldingsskema* is for marine mammal species under quota (bowhead, fin, humpback and common minke whales and beluga, narwhal, walrus and polar bear) while the *Piniarneq*/Luli database is for the other species (both marine and terrestrial mammals and birds). Until now, however, a few marine mammal quota-species have also been kept in *Piniarneq*, which provides the possibility for differentiating between direct catch and by-catch as separate reporting of by-catch has been introduced in *Piniarneq* in 2015.

DNA samples are taken from all catches of marine mammals and sent to Greenland Nature Institute.

No edible products from a licensed marine mammal may be sold before the catch is reported to the municipality. By this reporting the hunter will obtain a stamp on their license. To get a stamp it is required that a completed reporting scheme is handed in and for whalers with a harpoon boat license

also the receipt for the purchase of the whale grenade as well as the used grenade with serial number must be presented.

3. ICELAND

The responsibility for whaling lies with the Ministry of Industries and Fisheries and is regulated, administrated and supervised by the Directorate of Fisheries. Marine mammal hunting is subject to detailed regulations[6].

3.1 WHALES

Iceland hunts two species: the minke whale and the fin whale.

The minke whale hunt in Iceland is carried out with similar weapons and boats as are described for Norwegian minke whaling above. Minke whales are hunted in Icelandic coastal waters from small or medium sized (60-70 feet) fishing boats that are rigged for whaling in the spring and summer season. The weapons are deck mounted 50 mm Kongsberg harpoon guns equipped with the penthrite grenade (Whale Grenade-99) developed in Norway in 1997-1999. The grenade is loaded with 30 g pressed penthrite as explosive. Back-up rifles of calibers .375 or .458 using full metal jacket, round-nosed bullets are used if the whale is not instantly killed by the grenade detonation. The vessels usually search for whales at slow speed (4-6 knots/h) and the whales are often shot from a relatively short range (< 30m). No sonar or similar instruments are used during the hunt as such instruments are thought to scare the whales off.

Fin whale hunting is conducted from medium-sized boats that are exclusively used for whaling. Hunting grounds are within Iceland's 200-mile exclusive economic zone and the whales are towed to a land station for flensing and processing. The whales are killed using 90 mm Kongsberg harpoon guns and a modified Whale Grenade-99 designed to trigger the detonation of 100 g pressed penthrite explosive at a depth of 110 cm after penetration into the whale. The back-up weapon is a new grenade.

Hvalur hf.—the company hunting fin whales in Iceland—has, since 1985, worked to improve the killing efficiency in the hunt. Whale Grenade-99 replaced the former "Black Powder Grenade" (filled with 650 g of black powder as explosive) that had been used for large whales for at least 70-80 years. The killing by the "Black Powder Grenade" is a combination of the concussion from the blow and the wounds and tissue lacerations caused by the heavy splinters from the cast iron grenade. However, the wounding and killing efficiency of such splinters is highly unpredictable.

3.1.1 Training

No training courses or requirements exist on an annual basis. However, courses for gunners have been held regularly, and in order to get a licence to whale the gunner has to undertake a course on handling harpoon guns and grenades. In addition, he must have general license for firearms.

3.1.2 Monitoring and inspection system

There are random inspections carried out by the Directorate of Fisheries.

---

[6] Law No 26, May 3, 1949 on whaling, No 92, July 1, 1991 on amendments to Law 26/1949 on whaling (cf. Law No 40/1979 and 23/1991)

Regulation No 163, May 30, 1973 on whaling
No 359, April 6, 2009 on amendments to Regulation No 163 of May 30, 1973 on whaling (cf. Regulation No 304/1983, 239/1984, 862/2006, 822/2007, 456/2008 58/2009 and 263/2009). No 414, April 29, 2009 on the ban on whale hunting in specific areas.

Rules in the licenses for minke whaling and fin whaling.

3.1.3 Reporting system

In Iceland there is a self-reporting system to report the position, sex and length, foetus/size of foetus where all whale catches are reported to the Directorate of Fisheries.

3.1.4 DNA register

DNA samples of minke and fin whales are taken and recorded from all whales ensuring full traceability of whale products. The register, which includes the DNA profiles of all whales captured, permits the control and validation of all whale products sold in the domestic or international markets. It has also been used for a range of scientific purposes. The samples are analysed and stored at the Marine and Freshwater Research Institute (MFRI) in Reykjavik.

3.2 SEALS

In Iceland, primarily harbour and grey seals are hunted. In 2019 Iceland introduced a general ban on seal hunting with an exception under special licences for subsistence use. Previously landowners had the right to hunt seals on their land without any restrictions on numbers.

Traditional hunt: The traditional seal hunt in Iceland revolves around hunting pups. Harbour seal pups are mainly hunted using netting. Nets used for this purpose are large meshed nets, often referred to as sealing-nets. The pups are caught in nets set close to small rocky islands or across creeks and channels. The seal pups are then clubbed and subsequently bled. Recent animal welfare laws in Iceland forbid drowning as a killing method of animals, which means that the nets need to be monitored regularly to avoid that the pups drown. Grey seal pups, on the other hand, are almost entirely killed on land in pupping areas during the pupping period in October, using either a seal club or by shooting. Adult grey seals are sometimes hunted as well, using calibre rifles (.222 -243 calibre).

Culling around salmon estuaries: The largest removal of seals in Iceland currently occurs due to culling of harbour seals around river mouths that are considered important for salmon angling. The cull is intended to reduce the potential effect that seal predation is believed to have on salmonid stocks. Mainly adult harbour seals are killed in the river mouth, and the method used is shooting, usually by .22 calibre rifles. Hunters are required by law to collect the culled animals, and it´s forbidden to leave the carcass in the water.

3.2.1 Reporting

Hunters are not required to report their catches. Hunt statistics are collected by MFRI by direct contact with the hunters.

3.2.2 Training

There are no regulatory training courses on how to shoot or where to aim at the animal in Iceland, though a normal firearms license must be attained.

4. NORWAY

Marine mammal hunting is subject to detailed regulations (hunting seasons, quotas, methods of stunning and killing, training of hunters and their supervisors etc). The rules and regulations are laid down by the Ministry of Trade, Industry and Fisheries, and are administered and supervised by the Directorate of Fisheries.[7]

7

Act of 29 May 1981 No 38 - Wildlife and Wildlife Habitats (the Wildlife act)
Act of 27 March 1999 No 15 - The Right to Participate in Fisheries and Hunting
Act of 6 June 2008 No 37 - The Marine Resources Act
Act of 19 June 2009 No 97 - Animal Welfare

4.1 WHALES

The only targeted species is the minke whale.

Norwegian fishermen hunt minke whales from small (50 feet) or medium sized (60-120 feet) fishing boats that are rigged for whaling in the spring and summer season. The weapons are 50 mm or 60 mm harpoon guns. The harpoon is equipped with a penthrite grenade (Whale grenade-99) developed in Norway in 1997-1999. The grenade is loaded with 30g pressed penthrite as explosive. The back-up weapon is a rifle of calibre .375 or .458, using full metal jacket, round-nosed bullets. The vessels usually search for whales at slow speed (4-6 knots/h) and the whales are often shot from a relatively short range (< 30m). No sonar or similar instruments are used during the hunt as such instruments are thought to scare the whales off.

4.1.1 Training

Starting in 1984, all gunners and licence holders have been required to attend obligatory training courses. Shooting tests with both the harpoon gun and rifle must be passed annually. The recommendation is to fire the grenade at the whale from a side position (45°-135° - relative to the animal's long axis) and aim at the thorax (chest). The rifle is usually fired at close range and when the whale's head is over water. The shot is directed to the brain.

4.1.2 Monitoring system

In 2006, Norway introduced and made mandatory an automated monitoring system, and is thus far the only country to do so. This electronic system verifies when and where a shot has been fired and when a whale has been taken on board. Consequently, struck and lost whales are also recorded. All licensed whaling boats are equipped with an Electronic Trip Recorder (the Blue Box). The system cannot be manipulated and consists of a control and data logger box (Blue Box) designed to independently monitor and log hunting activity data. An independent GPS and different sensors deployed in certain areas and structures of the boat collect the data, and the programmes are designed for continuous operation and logging of data for at least 4 months. It is equipped with back-up batteries and automatic restart functions if a system interruption occurs.

After the hunting season, the encrypted data from the Blue Box are decrypted and analysed by authorized personnel in the Directorate of Fisheries. For more reading, see document Øen, EO: electronic monitoring of Norwegian minke whaling, IWC 2005.

4.1.3 Inspection

There are also random inspections occurring carried out by the Directorate of Fisheries. These inspectors have attended the same training courses as the whalers.

4.1.4 Reporting system

There is no mandatory reporting of time to death (TTD) or instantaneous death rates (IDR).

The reporting system in Norway is a combination of a self-reporting system and the automated Blue box. The automatic monitoring system is a supplement to the electronic catch reporting system. The hunters are obliged to electronically report the catch (or no catch) on a daily basis. This report includes

---

Executive Orders from the Ministry:
No 312 of 31 March 2000 - Regulation of the practice of hunting minke whales.
No 151 of 11 March 2003 - Regulation of the practice of hunting seals in the West Ice and the East Ice
No 1157 of 13 August 2006 – Regulation on special permission to execute hunting and fishing
No 1745 of 22 December 2009 - Regulation of the practice of hunting seals on the coast of Norway

Executive orders pertaining to the participation and governing of the hunt of Whales and Seals are issued annually by the Ministry and the Directorate of Fisheries.

information on catch, position of catch, sex, length, circumference, blubber dimension, foetus/size of foetus and number of grenades used in the catch.

4.1.5 DNA register

DNA samples are taken and recorded from all whales ensuring full traceability of whale products. The Norwegian minke whale DNA register was first established in the mid 1990s when Norway reinstated commercial minke whale hunting. The register, which includes the DNA profiles of all whales captured (approximately 9000 as of 2014), permits the control and validation of all meat and whale products sold in the domestic or international markets. It has also been used for a range of scientific purposes. The samples are analysed at the Institute of Marine Research and the register is hosted by the Directorate of Fisheries.

4.2 SEALS

4.2.1 The pack ice hunt

Today only the harp seal is hunted in the Greenland Sea (West Ice). Traditionally, also hooded seals were hunted in this area, but this hunt has been prohibited since2007. For many years, Norwegian vessels have also been allocated an annual quota in the Barents Sea (East Ice) in the Russian Economic Zone (REZ). After several years with no Norwegian hunting activity in REZ, hunting in this area was in 2018 and 2019 conducted by one Norwegian vessel.

Ocean going vessels suitable and equipped for seal hunting are licensed. The crew usually consists of 13 – 15 persons and they normally stay out at sea from 4 to 6 weeks during the hunting season.

Both weaned harp seal pups and adult harp seals (defined to be one year or older) are hunted. The seals must be resting on the ice. Shooting seals that are in the water is strictly prohibited. The seals are either shot from the vessel, from a smaller boat, or from the ice. All seals are shot to the head, and the shooting range is normally around 30 m for weaned pups and about 70 meters for adults. All adult animals are to be shot with a rifle. Pups may be shot with a rifle or killed on the ice by using a hakapik (or a seal blow hook, named slagkrok) as the only weapon. For all animals that are shot, the hakapik is mandatory to use as a secondary weapon. Slagkrok may be used as a secondary weapon on pups. The secondary weapon should be used as soon as possible after the animal is shot. In all animals, bleeding is to be performed immediately after the use of the secondary weapon. When the hakapik or slagkrok is used as the only weapon on pups, a blow to the head with the blunt part of the tool is immediately followed by a blow to the head with the spike. Today, almost all seals are killed with a rifle. Hakapik as the only weapon is only occasionally used to kill pups.

According to the regulations relating to the seal hunt it is explicitly forbidden to:

- Kill un-weaned pups
- Hunt adult harp seals in whelping areas
- Hunt seals that are in the water
- Shoot seals if conditions are such that they cannot be struck with a hakapik and be bled on the ice
- Hunt in artificial light
- Use lines, nets or any form of trap
- Use shotguns
- Use a hakapik on adult animals that have not been shot first
- Use a slagkrok on adult animals
- Strike with a hakapik or a slagkrok anywhere but on the skull.

The prescribed ammunition used for pups is similar to what is prescribed for the hunting of smaller terrestrial games (roe deer, fox, etc.), which is soft-nosed, expanding bullets with impact energy of minimum 981 Joules (100 kgm) at 100m (.222 calibre and higher).

The prescribed ammunition for adult seals is similar to large terrestrial mammal ammunition (moose, red deer, etc.) which is soft-nosed, expanding, projectiles with impact energy of at least 2700 Joules (275 kgm) at 100m for 9g bullets and 2200 Joules (225 kgm) at 100m for 10g bullets (6.5, .308 calibre and higher).

4.2.2 Coastal seal hunting

Recreational hunts on grey and harbour seals are conducted along the Norwegian coast, and on ringed and bearded seals along the coast of Svalbard. Along the Norwegian coast, the hunts are conducted from land or from smaller boats and are carried out using rifles. The ammunition requirements are the same as those required for ice-breeding seals. The surrounding water depth should be so shallow that the seal can be retrieved if shot in water. In Svalbard, the seals are hunted on the ice or on land, except for ringed seals that may be hunted in the water during the period 16 August – 30 November. All the hunts are licensed.

4.2.3 Training, reporting and inspection.

Prior to the pack-ice hunt, hunters and inspectors shall attend an annual course in animal welfare, legislation, and the conduct of the killing of seals. The shooters shall pass an annual shooting test, and personnel using the hakapik have to pass a practical test. It is mandatory to keep a catch logbook, report on the number of animals struck and lost, and to have an inspector on-board (usually a veterinarian) during the entire hunt. Vessels may also be required to take on-board international observers. In the coastal seal hunt, the hunter must also pass an annual shooting test. There is no mandatory reporting of TTD or IDR for neither of the hunts.

APPENDIX 5

Utilisation of Marine Mammal Resources is also a Question of Indigenous Peoples' Rights

The last 20 years have seen major achievements related to Indigenous peoples' rights. UN member states and Indigenous peoples have jointly developed a growing body of norms protecting and entitling Indigenous peoples as well as creating a number of international organs to advance these matters.

Relevant public international law in this regard includes treaties, declarations, norms and standards ranging from the UN Charter, the Universal Declaration of Human Rights, the International Covenant on Civil & Political Rights, the International Covenant on Economic, Social and Cultural Rights to the Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity published by the secretariat of the Convention on Biological Diversity.

The rights are affirmed specifically in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), adopted by the UN General Assembly in 2007, as well as the International Labour Organization Convention No. 169 (ILO 169). ILO 169 and UNDRIP are complementary and mutually reinforcing, and they both are an integral part of international human rights law. Their standards are relied upon to interpret Indigenous rights and the consequential State obligations.

UNDRIP is not a legally binding treaty, but many of the Indigenous peoples' rights today are included in customary international law. These are unwritten rules of international law that build on State practice and States' views of international law and are as binding as treaties. Noteworthy is the Outcome Document of the 2014 World Conference on Indigenous Peoples, wherein member States unanimously reaffirmed their support for the 2007 UNDRIP.

The IWC Expert Workshop on Aboriginal Subsistence Whaling (ASW, Maniitsoq 2015)[8], underlines that UNDRIP rests on three pillars, all of which are inter-complementary and interdependent:

- the right to self-determination,
- the right to land, territories and resources,
- cultural rights.

1. THE RIGHT TO SELF-DETERMINATION

The right to self-determination is a pure collective human right. It is affirmed in the UN Charter (article 1, paragraph 2 and article 55) and in multiple international conventions, treaties, declarations and most recently in the UNDRIP. The right to self-determination is described the same way in most of the UN and UN related documents mentioned above. To exemplify, the following article 1, paragraphs 1 – 3 from the International Covenant of Civil and Political Rights (1966) reads,

1. All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.

2. All peoples may, for their own ends, freely dispose of their natural wealth and resources without prejudice to any obligations arising out of international economic co-operation, based upon the principle of mutual benefit, and international law. In no case may a people be deprived of its own means of subsistence.

[8]Report from the IWC Expert Workshop on Aboriginal Subsistence Whaling (ASW), Maniitsoq, Greenland 2015. IWC/66/ASW Rep01

3. The States Parties to the present Covenant, including those having responsibility for the administration of Non-Self-Governing and Trust Territories, shall promote the realization of the right of self-determination, and shall respect that right, in conformity with the provisions of the Charter of the United Nations.

There are no legally binding definitions of peoples or indigenous peoples. However, according to Elsa Stamatopoulou[9], post UNDRIP 2007, the understanding of "peoples" now also includes a portion of a population of the State. The implications being that a State can host more than one people with the right to self-determination, and also that one people can expand across national borders.

Embedded in the right to self-determination lies the right to development. Cultures and societies are always in flux and thus are not static and frozen in time. Depending on external and internal factors like interchanges with other cultures, economic circumstances, climate change and intergovernmental policies to mention some, cultures and societies will always develop in various ways. ASW "emphasises the constant and complex changes all people, including Indigenous peoples, undergo, *inter alia,* due to external pressures such as political and economic developments, climate change and other factors affecting the access to natural resources. It affirms that this does not affect the status and rights of Indigenous peoples under international law". Regardless of how the distribution of the resources are organised, regardless if they are sold commercially – the peoples or societies involved do not become less indigenous. Hence, arguing that subsistence use implies no or little economic or monetary activity is going against the recognised rights of indigenous peoples.

2. THE RIGHT TO RESOURCES: FOOD SECURITY AND FOOD SOVEREIGNTY

Article 1 quoted above addresses the political dimension – the right to self-determination while article 2 addresses the resources or the economic dimension and states the right of a people to NOT be deprived of its own means of subsistence.

With reference to Chapter 6 of the main document, food security represents one of the major challenges faced by the world. Food security affects more than human health and welfare – it also contributes to economic and political stability. Today the issue of food security is highly complex, characterised by an interconnected and interdependent global food system fundamentally dependent on factors like soil, precipitation, water availability, and climate and influenced significantly by trade, urbanization, changing demographics and conflicts.

For people, food security is a question of economy and resources. WHO at its World Food Summit in 1996 noted that the pillars of food security are availability, accessibility, utilisation and stability. It stated that food should be available in sufficient quantities on a consistent basis and it should be accessible so that people obtain appropriate, nutritious food. Food security is dependent on a healthy and sustainable food system that focuses on Environmental Health, Economic Vitality and Human Health and Social Equity[10].

"*Food security exists when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (Word Food Summit 1996). This translates into cultural rights in terms of the food that people prefer to eat.

[9]Elsa Stamatopoulou, pers. com at IWC/ASW expert Workshop Maniitsoq, Greenland 2015.
[10]http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf

FAO related research on indigenous food systems shows the strength and promise of local traditional food systems to improve health and well-being in societies[11]. Indigenous peoples' right to their specific cultures includes their right to enjoy their traditional food as food traditions are at the core of indigenous identities, cultures and economics[12]. Hunting of marine mammals remains a valid defining characteristic of several indigenous identities. Based on different species and stocks hunted by diverse methods, and with a diversification of hunting activities, this multi-resource system increases food security by increasing the resilience of communities to food shortage in case of unfavourable environmental conditions or changes.

The concept of food sovereignty is based on the principle that decisions about food systems, including markets, production modes, food cultures and environments, should be made by those who depend on them. Support for autonomous community food systems, community-based research, and community-based solutions that respond to locally identified needs is essential, as these are all steps towards meeting the goal of sustainable and local food self-sufficiency[13].

3. CULTURAL RIGHTS

Cultural rights are reflected in at least 17 of the 46 articles of UNDRIP constituting the "boldest recognition of cultural rights in International Law to date". For example, Article 31 refers to the right to determine their own identity or membership in accordance with their traditions and customs. Article 33 refers to the right to their distinctive customs, spirituality, traditions, procedures and practices "*The Declaration recognises the right of Indigenous Peoples to self-determination and by virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development. Significantly as has been stated repeatedly by international bodies: the State must also respect special cultural rights of Indigenous peoples related to the continuation of certain economic activities linked to the traditional use of land and resources, such as hunting and fishing".* (Stamatopoulou 2015[14])

Traditional knowledge represents a way of life, but traditional knowledge of the local environment, combined with the related skill sets for harvesting, travelling on the land and water, and food processing, can also be understood as a set of cultural practices necessary for food security and food sovereignty. The extent to which this knowledge is transmitted to future generations plays an important role in determining the health and wellness of individuals and communities.

For the Inuit around the world and other Arctic peoples, hunting of marine mammals is a subsistence activity that they have the full right to exercise, but never the less are often denied.

"*You truthfully can't separate the way we get our food from the way we live,"* says *Cochrane[15]. "How we get our food is intrinsic to our culture. It's how we pass on our values and knowledge to the young. When you go out with your aunts and uncles to hunt or to gather, you learn to smell the air, watch the wind, understand the way the ice moves, know the land. You get to know where to pick which plant and what animal to take.*"

[11]Indigenous Peoples' food systems & well-being - interventions & policies for healthy communities. H.V. Kuhnlein, B. Erasmus, D. Spigelski, B. Burlingame, eds. ISBN 978-92-5-107433-6 © FAO 2013
[12] Elsa Stamatopoulou 2015. Presentation IWC/S15/ASW7 to IWC/ASW workshop Maniitsoq, Greenland 2015.
[13] Council of Canadian Academies, 2014. Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge. The Expert Panel on the State of Knowledge of Food Security in Northern Canada. Ottawa, ON.
[14]Elsa Stamatopoulou, ibid.
[15] Patricia Gadsby, Leon Steele: The Inuit paradox. http://discovermagazine.com/2004/oct/inuit-paradox