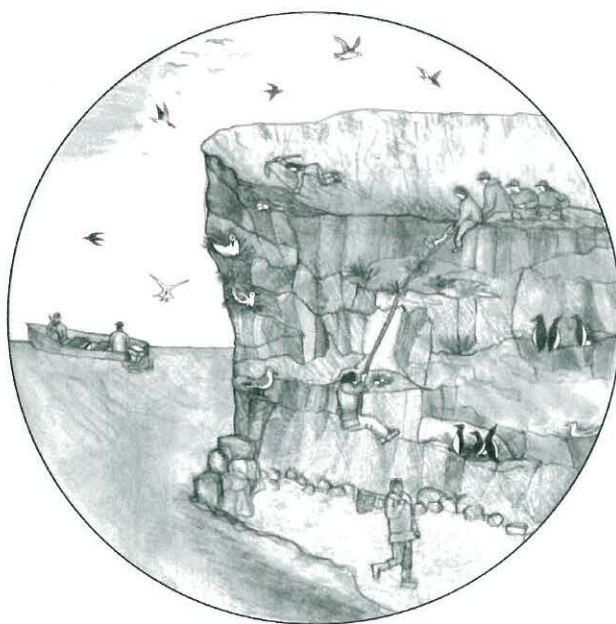




CAFF Technical Report No. 9

**SEABIRD HARVEST REGIMES
IN THE
CIRCUMPOLAR NATIONS**



Conservation of Arctic Flora and Fauna

About CAFF

The program for the Conservation of Arctic Flora and Fauna (CAFF) of the Arctic Council was established to address the special needs of Arctic ecosystems, species and their habitats in the rapidly developing Arctic region. It was initiated as one of four programs of the Arctic Environmental Protection Strategy (AEPS) which was adopted by Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States through a Ministerial Declaration at Rovaniemi, Finland in 1991. Other programs initiated under the AEPS and overtaken by the Arctic Council are the Arctic Monitoring and Assessment Programme (AMAP), the program for Emergency Prevention, Preparedness and Response (EPPR) and the program for Protection of the Arctic Marine Environment (PAME).

Since its inaugural meeting in Ottawa, Canada in 1992, the CAFF program has provided scientists, conservation managers and groups, and indigenous people of the north with a distinct forum in which to tackle a wide range of Arctic conservation issues at the circumpolar level.

CAFF's main goals, which are achieved in keeping with the concepts of sustainable development and utilisation, are:

- to conserve Arctic flora and fauna, their diversity and their habitats;
- to protect the Arctic ecosystems from threats;
- to improve conservation management laws, regulations and practices for the Arctic;
- to integrate Arctic interests into global conservation fora.

CAFF operates through a system of Designated Agencies and National Representatives responsible for CAFF in their respective countries. CAFF also has an International Working Group which meets regularly to assess progress. CAFF is headed up by a chair and vice-chair which rotate among the Arctic countries and is supported by an International Secretariat.

The majority of CAFF's activities are directed at conserving Arctic biodiversity—the abundance and diversity of Arctic flora, fauna, and habitats—and at integrating indigenous people and their knowledge into CAFF. In recognition of this, the Arctic Ministers in 1998 endorsed CAFF's Strategic Plan for Conservation of Arctic Biological Diversity as a framework for future program activities. The Strategic Plan is built around five objectives addressing biodiversity monitoring, conservation of genetic resources, species and habitats, establishment of protected areas, conservation outside protected areas, and integration of biodiversity conservation objectives into economic plans and policies. Examples of major projects CAFF is currently working on are: a status report on Arctic biodiversity; development of a program to monitor Arctic biodiversity; assessment of climate change impacts on Arctic ecosystems in collaboration with AMAP and other Arctic organisations; assistance with implementation of circumpolar conservation strategies for murre (guillemots) and eiders and for a Circumpolar Protected Areas Network (CPAN); preparing a Circumpolar Arctic Vegetation Map and listing and mapping rare Arctic vascular plants. Whenever possible, CAFF works in co-operation with other international organisations and associations to achieve common conservation goals in the Arctic.

CAFF PUBLICATIONS:

CAFF Habitat Conservation Reports (HCR):

- No.1 The State of the Protected Areas in the Circumpolar Arctic (1994)
- No.2 Proposed Protected Areas in the Circumpolar Arctic (1996)
- No.3 National Principles and Mechanisms for Protected Areas in the Arctic Countries (1996)
- No.4 Circumpolar Protected Areas Network (CPAN) Principles and Guidelines (1996)
- No.5 Gaps in Habitat Protection in the Circumpolar Arctic (1996)
- No.6 Circumpolar Protected Areas Network (CPAN) Strategy and Action Plan (1996)
- No.7 Circumpolar Protected Areas Network (CPAN) Progress Report 1997 (1997)
- No.8 Summary of Legal Instruments and National Frameworks for Arctic Marine Conservation (2000)
- No.9 Gap analysis on the Russia Arctic (2000)

CAFF Technical Reports:

- No.1 Incidental Take of Seabirds in Commercial Fisheries in the Arctic Countries (1998)
- No.2 Human Disturbance at Arctic Seabird Colonies (1998)
- No.3 Atlas of Rare Endemic Vascular Plants of the Arctic (1999)
- No.4 Global Overview of the Conservation of Arctic Migratory Breeding Birds Outside the Arctic
- No.5 AMAP/CAFF Workshop on Climate Change, Rovaniemi. 24-25 March 1998 (1998) (1999)
- No.6 CAFF/AMAP Workshop on a Circumpolar Biodiversity Monitoring Program, Reykjavik 7-9 Feb, 2000; Summary Report
- No.7 Workshop on Seabird Incidental Catch In the Waters of Arctic Countries, Dartmouth, Nova Scotia 26-28 April 2000; Report and Recommendations
- No. 8 CAFF Workshop on Conservation of Migratory Arctic Birds, Songli, Norway, 10-11 September 2000; Summary Report
- No. 9 Seabird Harvest Regimes in the Circumpolar Nations

CAFF Strategies

- Circumpolar Protected Areas Network (CPAN) Strategy and Action Plan (1996)
- International Murre Conservation Strategy and Action Plan (1996)
- Circumpolar Eider Conservation Strategy and Action Plan (1997)
- The Co-operative Strategy for Conservation of Biological Diversity in the Arctic Region (1997)
- Strategic Plan for the Conservation of Arctic Biological Diversity (1998)

Program Management and Meetings

- CAFF Report to Ministers 1996 (March 1996)
- CAFF Report to SAAOs 1997 (June 1997)
- Report of the Working Group 1992-1993 (1993)
- Third Meeting of the CAFF International Working Group (CAFF III), Reykjavík 1994: Proceedings (1994)
- Fourth Annual Meeting of the CAFF International Working Group (CAFF IV), Moscow 1995: Summary Report (1996)
- Fifth Annual Meeting of the CAFF International Working Group (CAFF V), Rovaniemi 1996: Summary Report (1997)
- Sixth Annual Meeting of the CAFF International Working Group (CAFF VI), Nuuk 1997: Summary Report (1998)
- Seventh Meeting of the CAFF International Working Group (CAFF VII), Yellowknife 1999: Summary Report (1999)
- Eighth Meeting of the CAFF International Working Group (CAFF VIII), Trondheim 2000: Summary Report (2000)
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CONSERVATION OF ARCTIC FLORA AND FAUNA (CAFF)

Seabird Harvest Regimes in the Circumpolar Nations

Editors: Lynn Denlinger and Kenton Wohl

CAFF Technical Report No. 9

Prepared by the

CIRCUMPOLAR SEABIRD WORKING GROUP (CSWG)

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EXECUTIVE SUMMARY

This Technical Report is a product of the Circumpolar Seabird Working Group of the Conservation of Arctic Flora and Fauna (CAFF) program of the Arctic Council.

Section 1 introduces the topic of seabird harvest regimes.

Section 2 describes seabird harvest regimes and impacts in Alaska (USA), Canada, Finland, Greenland, Iceland, Norway, and Russia and provides national recommendations.

Alaskan seabird harvests have been part of annual subsistence cycles of indigenous cultural groups for thousands of years. Effective reporting, documentation, and regulation of this traditional hunt have been lacking. Information on subsistence harvests has been collected since the early 1980s, but data on seabirds was collected anecdotally. There are several methodological problems in producing reliable information on subsistence patterns and current numbers are considered to be minimum estimates. In 1996, an estimated 36,424 seabirds were harvested. This represents 9.8% of the total migratory birds harvested in Alaska. The two most common species harvested were crested auklets (12,310) and common murre (9,743). The total estimated number of seabird eggs harvested in 1995 was 115,345. This represents 79.5% of all eggs harvested in Alaska. The most commonly harvested seabird eggs were gulls, followed by murre and tern. Until 1999, the harvest of seabirds in Alaska was unregulated and not managed. However, with the advent of the 1999 Protocol Amendments to the Migratory Bird Conventions with Great Britain (for Canada) and Mexico, seabird harvests will now be recognized and regulated. The Protocol mandates that subsistence users will have an effective role in the development and implementation of regulations through management bodies. Development of the management bodies should be accomplished in the year 2000 and regulations will be established by the year 2002.

Canada also has a long history of seabird harvests by indigenous peoples dating back thousands of years. On the Atlantic coast, fishermen and settlers from Europe brought with them a tradition of seabird hunting that has continued for the past 500 years. Today, seabird harvesting is much less widespread, although hunting efficiency has increased harvests for some species such as murre. With the exception of cormorants, seabirds in Canada are managed under the Migratory Bird Convention of 1916 and are protected under federal legislation. Cormorants are protected by provincial legislation (although culls of double-crested cormorants take place in Atlantic Canada). Auks and eiders are legally hunted by Native peoples in all coastal regions. Eiders are hunted by non-Native people mainly in Atlantic Canada. In Newfoundland and Labrador, residents legally hunt thick-billed and common murre. In Labrador, Native people legally harvest Atlantic puffins, dovekie, razorbill, and black guillemot. Non-Native people in Labrador, insular Newfoundland, and the Québec North Shore are also known to illegally harvest these species along with shearwaters, *Larus* gulls, black-legged kittiwakes, and tern. Egg harvesting of auks and eiders is legal for Native people and occurs at some locations in the Arctic and Labrador. Migratory birds and their eggs may not be sold in Canada. The total annual seabird harvest in Arctic Canada is hard to estimate, but is probably 25,000 birds, of which about half are common eiders. The harvest of seabird eggs in Arctic Canada is not as widespread as bird hunting and the level of egg harvesting appears to be low. The largest and most significant consumptive

use of seabirds in Canada occurs in Newfoundland and Labrador where 600,000-900,000 birds (mostly thick-billed murres) were taken annually. Since 1993, however, restrictions in the form of a bag limit and shorter hunting seasons cut the harvest by more than half to about 200,000-300,000 birds. This level of harvest is considered sustainable. Estimates of the size of the common eider harvest in Atlantic Canada vary widely and it is difficult to provide a definitive number. It is likely that the harvest is underestimated as poaching appears common in some places, and national game bird harvest surveys are conducted too early in the season to capture sea duck harvest.

Finland's seabird harvesting potentially occurs throughout the archipelago. Game belongs to the landowner and most of the archipelago is private land. Egging of seabirds has been banned in Finland since 1962; however, egging of common mergansers (goosander) is still allowed in the Åland Islands. Most seabirds are protected by the Nature Conservation Act. The Åland Islands comprise an autonomous region which has its own Hunting Act. The mean annual bag of sea ducks from 1991-1997 was 81,000 individuals. This represents 11% of the total waterfowl harvest on the Finnish side of the archipelago. In the Åland Islands this share is far larger; *e.g.*, 75-80%. Harvesting has been on a sustainable level and sufficiently regulated in terms of keeping populations stable or allowing them to grow.

Greenland has a long history of seabird harvests. Historically, seabirds were taken for down, skins, eggs, and meat. Growth of the human population and modernization of transportation and hunting tools have increased the seabird harvest for several species over the last hundred years. All birds are protected under Executive Order No. 20 of 1989. There is, however, an open hunting season in Greenland for 26 bird species, including Arctic tern, for which only egging is allowed. Nine species have special closed seasons. The restrictions are divided geographically and in some areas hunting is allowed all year. Generally, the harvest time is longest in North and East Greenland where the birds arrive very late during the spring and the human population is sparse. Harvest of eggs is not allowed with the exception of subsistence harvest of eggs from parasitic jaegers (Arctic skua), Arctic terns, northern fulmars, great black-backed gulls, Iceland gulls, glaucous gulls, kittiwakes, black guillemots, and dovebies until 1 July. In Avanersuaq and Ittoqqortoormiit Municipalities, it is permitted to collect eider eggs and down until 25 June. Bird hunting is licensed on a professional and leisure-time basis. It is legal to shoot birds for personal use and local sale at open air markets for both kinds of hunters. Hunting statistics have been compiled since 1993. The harvest information relates to the taking of birds, but not of eggs. Common murres (common guillemot), thick-billed murres (Brünnich's guillemot), and common and king eiders are the most commonly taken seabird species in Greenland. Dovebies and kittiwakes are also harvested frequently in certain regions of the country. For the last 50 years the harvest of murres has been well documented. Information about the harvest of other seabirds is limited. Hunting statistics for murre species, black guillemots, king and common eiders, kittiwakes, and dovebies for the years 1993-1996 range from 187,645 (in 1994) to 253,286 (in 1996). Based on counts of birds available for purchase at the open market, the harvest of murres in Greenland might be as high as 390,000. It is known that illegal harvesting of murre eggs takes place in Greenland, but the extent of this harvest is unknown. Since 1990, the Home Rule Government has granted limited commercial production of murres in settlements and small towns in South Greenland municipalities. Hunters in these municipalities sold an average of 18,227 murres each year to processing companies. Public outreach programs have been designed and implemented to reduce illegal hunting.

Icelandic seabird hunting at sea is most intense near towns and villages especially in the north and east fjords, northwestern fjords, and the Faxaflói region in the west-southwest. Eider is economically the most important seabird species, mainly for its down. Eider down is approximately a \$2 million (US) industry per year, divided (unequally) among 250-300 landowners. About 3 tons of eider down is collected per year from nests. Hunting data have been compiled in Iceland since 1995. The data apply only to the taking of birds, not eggs, though seabird eggs are also harvested. Puffins are taken in the largest numbers (185,000-233,000) per year. Between 86,000 and 113,000 common murres, thick-billed murres, and razorbills are also hunted annually. Other seabird species are taken for food in much smaller numbers. Large numbers of gull species are killed each year as pests. All landowners (state, other local authorities, or private individuals) have the right to allow or ban hunting. The Ministry for the Environment supervises the Act on Conservation, Protection, and Hunting of Wild Birds which took effect in 1994. There are specific seasons for hunting of individual species. Harvest levels are not thought to greatly affect any of the seabird populations at the national level.

Norway has a long tradition of marine bird harvests in the north Barents Sea region. Egging, down collection, and harvesting of adults and chicks were traditionally all important for rural people, both commercially and for personal use. Today, the extent of harvesting has been reduced and subjected to strict regulations. Due to the strict regulations, harvesting of seabirds is not an important threat to marine birds in the Barents Sea region of northern Norway. Egging and hunting of common murres, however, almost certainly has contributed to the decline of the population on the Norwegian coast. Poaching of this species still occurs at some colonies and may be a serious threat to the potential recovery of local populations.

Russian seabird harvesting in historic time coincided with the colonization of northwest Russia and parts of the northeast. The earliest records of local people using murres for their meat, feathers, and skins in the Russian Barents Sea region are from the early nineteenth century. By the middle of the twentieth century, the number of murres and their eggs collected increased dramatically until more than 3,000,000 murre eggs and 500,000 adult birds were harvested annually. It became obvious that conservation measures were needed to prevent a complete destruction of murre colonies. At the same time, several state reserves were established and hunting regulations were put in place. In northeast Russian, indigenous people have harvested seabirds from ancient times and continue to do so today, but on a limited basis. When Russian expeditions went ashore on the Commander Islands in the mid-1700s, seabird resources were exploited intensively. This may have contributed to the extinction of Pallas's cormorant (*Phalacrocorax perspicillatus*). The islands were settled by Russians and Aleuts during the 19th century and seabirds and their eggs continued to be harvested today by the tens of thousands.

Section 3 lists the national and general recommendations regarding seabird harvest programs and calls for the adoption of international guidelines for documentation and reporting of seabird harvest and regulatory activities.

Section 4 and Appendix A include references and the scientific names for seabird species mentioned in this technical report.

1. INTRODUCTION

Seabirds and their eggs are harvested throughout the circumpolar region. In almost all countries, seabird harvests date back thousands of years. Historically, birds were hunted for meat, eggs, skins and down. It is unlikely that the harvest had any widespread impact until the 20th century. Communities were small and hunting was done primarily from non-motorized watercraft. In this century, human population growth, mechanized transport, and the use of guns as hunting tools have increased the harvest of certain species of seabirds. This increase in hunting pressure has occurred simultaneously with increases in human disturbance at some seabird colonies related to offshore oil and gas development, commercial fisheries, tourism, and research.

The question of whether seabird hunting is a conservation concern is unanswered in the circumpolar region. This is due to a lack of information on the status of seabird populations and the numbers of birds and eggs harvested. Some evidence exists, however, that hunting near breeding colonies may be a major cause for substantial decreases in breeding populations (*e.g.*, murre in West Greenland) (Evans and Kampp 1991; Falk and Durinck 1992).

Seabirds are an internationally shared resource. Birds being harvested in one country may be from the breeding population of another country. For example, a considerable part of the molting and wintering population of king eiders found in West Greenland between August and May are of Canadian origin. During this same period, many eiders are shot in Greenland, although the origin of those eiders is uncertain (Frich 1997e). Documentation and reporting of seabird harvests and regulatory activities by the eight countries participating in the Conservation of Arctic Flora and Fauna (CAFF) program are considered beneficial to ensure that harvests, especially for shared populations, occur on a sustainable basis.

Seabird harvests differ among countries from little or no harvesting to largely unregulated harvesting, and from personal use to commercial harvests. Management and regulation of harvests also varies widely among the nations. There also are large differences in the amount of information available to assess the magnitude and impact of seabird harvests.

This report is the first cooperative effort to summarize information on seabird harvest activities, harvest regulations, and management approaches of the arctic countries. It summarizes country recommendations for future management and study activities concerning seabird harvests, and presents management recommendations for the circumpolar region.

This circumpolar seabird harvest project is a product of the *Circumpolar Seabird Working Group (CSWG)*. The working group functions under the auspices of CAFF, which was initially established under the *Arctic Environmental Protection Strategy (AEPS)* in 1991 and is now part of the *Arctic Council*.

2. NATIONAL REPORTS

Alaska (USA)

Canada

Finland

Greenland

Iceland

Norway

Russia

2.1 HARVEST OF SEABIRDS IN ALASKA

by Lynn M. Denlinger and Kenton D. Wohl

U.S. Fish and Wildlife Service
Alaska (USA)

2.1.1 Introduction

Dating back thousands of years, Eskimo, Aleut, and Indian groups in Alaska gathered eggs and took birds for food and raw materials. These traditional uses continue to be part of a unique socioeconomic system in the northern regions (U.S. Department of Interior 1980, Wolfe and Walker 1987). In Alaska, *subsistence* is defined in federal and state laws as “customary and traditional uses” of wild renewable resources for food, materials, sharing, barter, and customary trade. This report summarizes information on the subsistence harvest of seabirds and their eggs in rural Alaskan communities and is based on harvest survey information primarily collected by the Alaska Department of Fish and Game and the United States Fish and Wildlife Service (USFWS).

Major groups of seabirds considered in this report are auks (murres, guillemots, murrelets, auklets, puffins), cormorants, gulls, terns, jaegers, kittiwakes, phalaropes, loons, and grebes. Sea ducks and shorebirds are not included. For information on the subsistence harvest of eider species in Alaska, the reader is referred to Paige and Wolfe 1998, Wentworth 1998, and USFWS 1999a.

Alaska’s extensive estuaries and offshore waters provide breeding, feeding, and migrating habitat for about 100 million seabirds of 72 species (USFWS 1992 , USFWS 1999b). The Alaskan breeding population of 40 species is estimated to be about 50 million birds which is about 96% of all seabirds breeding in the continental United States (USFWS 1999b). Approximately 50 million additional seabirds migrate from breeding areas in the central and south Pacific Ocean to spend the northern summer off the Alaskan coast (USFWS 1992). Breeding colonies in Alaska number about 1700 and range in size from a few birds to more than 2.5 million. Although large numbers of seabirds are found in Alaska in some seasons, most of their life cycle is spent away from land. Several populations occurring in Alaska are shared with Canada, Russia, Japan, and countries in the southern hemisphere (USFWS 1992).

The USFWS has trust responsibility for the conservation and protection of migratory birds (including seabirds) in the United States. Seabird management policies and programs in Alaska are primarily concerned with protecting seabirds on and off national wildlife refuges, collecting information, and providing the public with opportunities to enjoy seabirds.

Subsistence harvest surveys were initiated in the mid-1980s in Alaska to document the waterfowl harvest; detailed information on the seabird harvest was absent prior to 1990.

2.1.2 Legal framework for subsistence harvest of seabirds in Alaska

The United States signed international conventions on migratory bird conservation with the following four countries: Great Britain (for Canada) in 1916, Mexico in 1936, Japan in 1972, and U.S.S.R. (Russia) in 1976. All four of the Conventions are implemented in the United States by the Migratory Bird Treaty Act of 1918 as amended. The Conventions with Japan and Russia fully recognize the legitimacy of subsistence harvests by indigenous people. The 1916 Convention with Canada was the most restrictive: it prescribed a closed season on the harvest of migratory birds between 10 March and 1 September, thereby making it illegal for Native people to continue to hunt most birds and gather eggs in the spring as they had done for generations.

The only provision for subsistence in Alaska was as follows:

“Indians may take at any time, scoters for food but not for sale (Article II.1); and Eskimos and Indians in any season, may take auks, auklets, guillemots, murre, and puffins, and their eggs for food and their skins for clothing, but the birds and eggs are not to be sold or offered for sale (Article II.3).” (Aug. 16, 1916, 39 Stat. 1702, T.S. No. 628)

As of 1973 USFWS administrative regulations also permitted year-round harvest of cormorants and their eggs for food or clothing. The harvest is open to any person, but birds and eggs cannot be sold or offered for sale. (50 CFR § 20.132 1981)

In 1999 Protocol Amendments to the Conventions with Canada and Mexico were ratified, achieving long-sought goals: (1) to bring the law into conformity with actual harvest practices in Alaska and (2) to permit the effective regulation of the traditional spring hunt. In Alaska, with a few notable exceptions, the original prohibition against spring hunts have not been actively enforced, and indigenous people have continued their spring harvest traditions.

The 1999 Protocol Amendments continue the basic closed hunting season between 10 March and 1 September with the following exception in Article II (4b):

“Migratory birds and their eggs may be harvested by the indigenous inhabitants of the State of Alaska. Seasons and other regulations implementing the non-wasteful taking of migratory birds and the collection of their eggs by indigenous inhabitants of the State of Alaska shall be consistent with the customary and traditional uses by such indigenous inhabitants for their own nutritional and other essential needs.” (Treaty Doc. No. 104-28)

An *indigenous inhabitant* of Alaska is understood for the purposes of the Protocol as a permanent resident of a village within a subsistence harvest area, regardless of race. The above paragraph authorizes the United States to establish regulated spring and summer harvests of birds, their eggs, and their down in Alaska.

In North America, the harvest of migratory birds is now managed in accordance with this amended Convention.

The Preamble to the Protocol Amendment with Canada states that any significant increase in the take of species of migratory birds relative to their continental population sizes and compared to the take that is occurring at present would be inconsistent with the amended Convention. The Protocol mandates that subsistence users will have an effective and meaningful role in the

development and implementation of regulations through management bodies. These management bodies will include Native, Federal, and State of Alaska representatives as equals and will develop recommendations for the USFWS and Flyway Councils. Among other things, seasons and bag limits, law enforcement policies, population and harvest monitoring, education programs, research, use of traditional knowledge, and habitat protection will be developed by the management bodies. The management bodies are to be established in the year 2000, and harvest regulations are expected by the year 2003.

2.1.3 Socioeconomics of the subsistence harvest of Alaskan seabirds

Alaskan communities that engage in subsistence harvests of seabirds are generally inaccessible by road. Their resident populations are primarily Alaska Native: Aleut, Yup'ik Eskimo, and Inupiat Eskimo. The communities are small, with sizes ranging from less than 100 to 4,000 persons; most have populations under 400. The economy of these communities is based on the fish and wildlife resources found in the area, incorporates cash and wage labor, and operates within the various cultural contexts.

Seabird hunting and egg gathering are activities generally done in family groups. These activities while done first to produce food, also provide meaningful work, help young people define their cultural identity, and bind families together.

Actual dollar values of subsistence seabird harvests in Alaska are difficult to quantify since seabirds and their eggs cannot be bought or sold. Replacement values can be implied based on prices for chicken and other meat products from commercial stores. Chicken and commercial eggs, however, have neither the equivalent freshness nor quality of seabirds and their eggs, nor the same taste. Seabirds and their eggs are the culturally preferred food and an economically and nutritionally sensible food choice. The single best source of USFWS subsistence harvest surveys is Wentworth (1998).

Harvest methods

Past methods of harvesting seabirds include nets on hand-held poles or clubs on St. Lawrence Island (Oozeva 1985; Uhl and Uhl 1977); baited fishhooks on lines in the Wainwright region (Nelson 1981); slingshots and catching auklets by hand on King Island (Paige et al. 1997).

Harvesting seabirds remains an important activity on St. Lawrence Island today, but harvesting is done primarily using motorized boats, blinds, and shotguns. Egg harvesting also remains an important summer activity and methods have not changed much. People still gather murre eggs from cliffs by climbing with ropes or by hand.

2.1.4 Seabird harvest surveys

Background

Until the 1999 Protocol Amendments to the Migratory Bird Convention, traditional hunting activities were difficult to incorporate into the harvest management systems of the North American Flyways. The lack of regulation of subsistence harvests made it impossible to determine harvest levels through means typically used with sport hunters, such as hunting licenses, duck stamps, hunter check stations, and mail questionnaires. Seabird harvest information is available only after 1990.

Methodology

During the 1980s and 1990s, the Alaska Department of Fish and Game, the USFWS, village tribal governments, Native regional organizations, other government organizations, and rural subsistence hunters worked cooperatively to collect information on subsistence uses of wild resources in rural Alaskan communities (Fall and Schichnes 1990; Wolfe and Walker 1987; Wolfe et al. 1990; Wentworth 1994, 1998; Braund, S. R. & Associates and Institute of Social and Economic Research 1989a and b). Subsistence harvests have been estimated with household surveys of hunters in select communities.

The source of data for this paper is a report by the Alaska Department of Fish and Game (Paige and Wolfe 1998). That report consolidated and standardized all the subsistence harvest data from the various agencies to provide the first statewide picture of subsistence in Alaska to the species level. Certain conventions have been followed to make data sets compatible across the different studies including standardizing them to the year 1996.

Harvests of birds in unsurveyed communities were estimated with either: (1) the mean per capita harvest for the community's region calculated from the sampled communities; or (2) the per capita harvest from a similar, nearby surveyed community.

The estimated egg harvest numbers presented in this report are from an earlier Paige and Wolfe report (1997). The estimates are considered minimal.

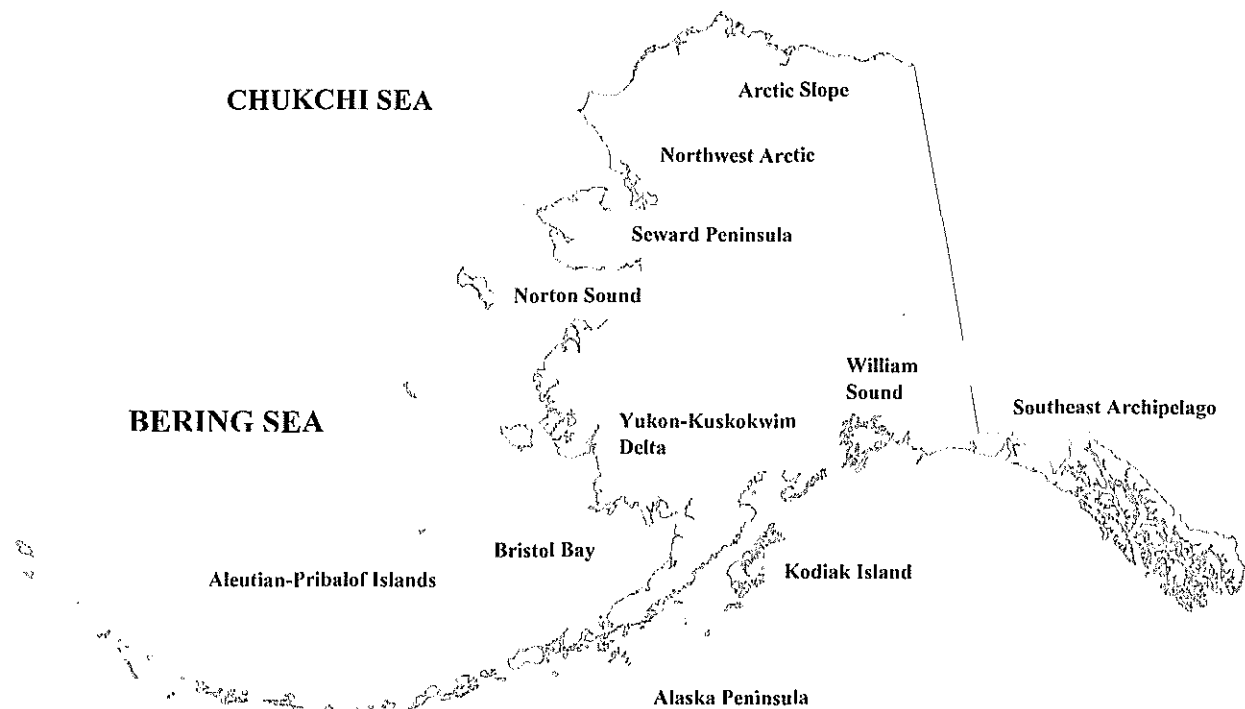


Figure 1. Map of Alaska with names mentioned in text

There are several methodological problems in producing reliable information on subsistence harvests: memory accuracy of respondents, variation in species classification systems used by different surveys, species misidentifications, units of measure (e.g., pounds of birds versus numbers of birds), language differences, and year to year variability in hunting due to ecological, economic, and cultural factors. Despite assurances regarding the protection of confidentiality of respondents, strategic responses by hunters fearful of legal prosecution resulted in inaccurate harvest reports in some instances.

Seasonality

Based on reporting areas through 1995, 51.4% of the rural subsistence migratory bird harvest was taken during a spring (March-early June) period, 4.4% during the midsummer (early June-July) period, and 44.3% during the late summer-fall-winter (August-February) period (Wolfe et al. 1990).

Regional highlights

Subsistence harvests for at least one year have been collected in 199 out of 258 rural Alaska communities through 1998 (Table 1). Ten communities surveyed for the first time in 1997 and 1998 are not included in this report (unpubl. USFWS data).

Table 1. Seabird subsistence harvest by rural area in Alaska, 1996.

Region	1996 Rural Population	Percent Alaska Native	Total Rural Communities	Communities Sampled*	Seabirds per person	Seabirds (Number of birds)
Upper Yukon-Koyukuk-Lower Tanana	5,821	72.2	31	10	0.00	0
Upper Kuskokwim River	1,310	62.9	11	2	0.00	0
Upper Tanana River	1,962	32.0	8	6	0.00	0
Parks Highway	1,887	3.9	9	7	0.00	0
Copper River Basin	3,466	16.5	22	22	0.00	0
Upper Cook Inlet	234	44.1	2	2	0.00	0
Prince William Sound	2,881	15.9	3	3	0.00	0
Lower Kenai Peninsula	738	48.8	3	3	0.01	5
Alaska Peninsula	3,926	53.3	17	16	0.00	6
Arctic Slope	7,157	72.2	10	5	0.003	14
Kodiak Island	14,028	15.8	9	9	0.002	27
Northwest Arctic	6,525	85.9	11	7	0.01	49
Bristol Bay	4,617	74.8	18	16	0.13	603
Yukon-Kuskokwim Delta	21,483	86.4	41	26	0.06	1,261
Southeast Archipelago	30,256	28.9	39	33	0.04	1,315
Aleutian-Pribilof Islands	6,182	18.2	8	6	0.32	1,961
Seward Peninsula-Norton Sound	7,662	72.2	13	13	0.40	3,044
Saint Lawrence-Little Diomed Islands	1,423	93.4	3	3	19.77	28,139
Total	121,559	50.2	258	189*		36,424

* A total of ten additional communities were surveyed for the first time in 1997 and 1998 for a total of 199 (unpublished USFWS data).

Adapted from: Paige, A.W. and R.W. Wolfe. 1998. The Subsistence Harvest of Migratory Birds in Alaska - 1996 Update. Alaska Dept. Fish and Game, Juneau, AK.

The two most common seabird species harvested statewide in 1996 were crested auklets (12,310 or 33.8 % of total seabirds harvested) and common murres (9,743 or 26.7% of total). Ninety percent of the common murres and all crested auklets were harvested by communities in the Saint Lawrence-Little Diomede Islands region. Other seabirds taken included the following: cormorants (2,574), gulls (1,571), common loons (863), red-legged kittiwakes (688), black-legged kittiwakes (476), yellow-billed loons (449), thick-billed murres (433), least auklets (384), parakeet auklets (267), Pacific and Arctic loons (116), red-throated loons (60), ancient murrelets (30), tufted puffins (65), Arctic terns (21), and horned puffins (48). In addition, 6,326 birds not identified to species were harvested (primarily unspecified auklets, 4,743) (Table 2).

Table 2. Seabird subsistence harvest by species and rural area^a in Alaska, 1996 (number of birds).

Species	Lower Kenai Pen.	AK. Pen.	Arctic Slope	Kodiak Island	North -west Arctic	Bristol Bay	Yukon- Kusko- kwim Delta	South- east	Aleutian- Pribilof Islands	Seward Peninsula- Norton Sound	Saint Lawrence- Little Diomede Islands	Species Total
Unspecified Grebe		2										2
Arctic Tern					0	20	1		0	0	0	21
Ancient Murrelet									30			30
Unspecified Loon	5	0	6	0	4				0	1	16	32
Horned Puffin		0							37		11	48
Red-Throated Loon		0	3		3	0	36		0	18	0	60
Tufted Puffin		0							40		25	65
Unspecified Puffin	0	0		0	0			0	77	38	0	115
Pacific Loon (Arctic) ^b		0	1		1	3	27		0	1	83	116
Unspecified Murre	0	0	4		31					146	0	181
Parakeet Auklet		0		27					7		233	267
Least Auklet		0							84		300	384
Thick-billed Murre					0				27	174	232	433
Yellow-billed Loon						112	296		0	0	41	449
Black-Legged Kittiwake		0				0			422		54	476
Red-Legged Kittiwake									688			688
Common Loon		0			3	55	479		0	17	309	863
Unspecified Seabird					7			1,246				1,253
Unspecified Gulls	0	4		0		405	371		0	17	774	1,571
Cormorant	0	0		0				69	89	24	2,392	2,574
Unsp. Auklet		0			0			0	29	2,128	2,586	4,743
Common Murre		0			0	8	51		431	480	8,773	9,743
Crested Auklet		0							0		12,310	12,310
TOTAL	5	6	14	27	49	603	1,261	1,315	1,961	3,044	28,139	36,424

^aUpper Yukon-Koyukuk-Lower Tanana, Upper Kuskokwim, Upper Tanana, Parks Hwy., Copper River Basin, Upper Cook Inlet, and Prince William Sound regions reported 0 for Total Seabirds.

^bPacific Loon (*Gavia pacifica*) and Arctic Loon (*Gavia arctica*) have been lumped with almost all being *Gavia pacifica*.

Adapted from: Paige, A.W. and R.W. Wolfe. 1998. The Subsistence Harvest of Migratory Birds in Alaska - 1996 Update. ADFG, Juneau, AK.

The total number of seabird eggs harvested in Alaska was about 115,345, representing almost 80% of all eggs harvested in Alaska. The total number of eggs harvested of all bird species was 145,055 (Table 3).

The harvest of seabird eggs was more evenly distributed geographically than the seabird harvest. Egg harvests for different regions are as follows: Bristol Bay (25.9%), Seward Peninsula-Norton Sound (18%), St. Lawrence-Little Diomed Islands (15.8%), Yukon-Kuskokwim Delta (8.5%), Arctic Slope (6.7%), Northwest Arctic (6.1%), Aleutian-Pribilof Islands (5.7%), Kodiak Island (5.4%), Alaska Peninsula (4.7%), Southeast Archipelago (2.5%) Prince William Sound (.4%), and Lower Kenai Peninsula (.3%) (Table 3).

The most commonly harvested seabird eggs were unspecified gulls, murres, and terns. Murre eggs were most commonly harvested in the Seward Peninsula-Norton Sound and Northwest Arctic regions. Tern egg harvests occurred more commonly in the Kodiak Island and Bristol Bay regions, and gull egg harvests were the largest in the Bristol Bay and Northern Alaska Peninsula regions (Paige and Wolfe 1997).

Table 3. Seabird egg harvests by rural area in Alaska, 1995 (number of eggs).

Region	Seabird Eggs (Per person)	Seabird Eggs (Number of Eggs)	Total Eggs (All bird species)
Upper Yukon-Koyukuk-Lower Tanana	0.00	0	0
Upper Kuskokwim River	0.00	0	0
Upper Tanana River	0.00	0	5
Parks Highway	0.00	0	0
Copper River Basin	0.00	0	0
Upper Cook Inlet	0.00	0	0
Lower Kenai Peninsula	0.45	337	337
Prince William Sound	0.15	451	465
Southeast Archipelago	0.10	2,932	3,078
Alaska Peninsula	1.36	5,477	5,758
Kodiak Island	0.41	6,299	6,381
Aleutian-Pribilof Islands	1.01	6,617	7,144
Northwest Arctic	1.07	7,091	10,571
Arctic Slope	1.10	7,677	12,364
Yukon-Kuskokwim Delta	0.46	9,823	20,540
Saint Lawrence-Little Diomed Islands	13.30	18,263	18,280
Seward Peninsula-Norton Sound	2.69	20,473	27,545
Bristol Bay	5.56	29,905	32,587
Total Harvest		115,345	145,055

Adapted from: Paige, A.W. and R.W. Wolfe. 1997. The Subsistence Harvest of Migratory Birds in Alaska - Compendium and 1995 Update. Alaska Dept. of Fish and Game, Juneau, AK.

2.1.5 Management recommendations

To determine potential impacts of subsistence harvests on Alaskan seabird populations, improved information is needed on the harvests themselves, population ecology, and human disturbance at breeding colonies. To assess the magnitude and impact of the subsistence harvests on seabird populations in Alaska and to maintain the opportunity for rural residents to harvest seabirds at a sustainable level the following are recommended:

- Monitor seabird populations, productivity, diets, and survivorship at selected colonies (especially in the Bering Sea region) to determine population trends.
- Maintain and update the Beringian Seabird Colony Catalog database; conduct new censuses to improve population estimates.

- Continue cooperative efforts with Native organizations and the Alaska Department of Fish and Game to collect and analyze data on subsistence harvests of seabirds in Alaska.
- Develop a license or permit system for the spring seabird harvest that would improve the information on the number of hunters and their harvests.
- Improve harvest surveys to collect more reliable species-specific information.
- Determine the economic value of consumptive and non-consumptive uses of seabirds in Alaska.
- Document the role of seabird products in subsistence cultures in Alaska.
- Work with rural Alaskans to collect traditional knowledge regarding seabirds and their harvests.
- Conduct studies on the effects of human disturbance at seabird colonies to determine how to reduce those effects during the harvest period.
- Reduce disturbance at seabird colonies during the breeding season by restricting the distance from the colony that shooting can take place.
- Reduce the local subsistence harvest of seabird populations that are declining significantly at specific seabird colonies.
- Develop or improve outreach and education programs to (1) disseminate seabird harvest information to rural communities, and (2) reduce unnecessary disturbance at seabird colonies which are harvested.
- Continue participation in international forums and agreements that provide opportunities for cooperative and coordinated management, research, and conservation of shared populations of seabirds.

2.2 SEABIRD HARVEST IN CANADA

by John W. Chardine

**Canadian Wildlife Service
Canada**

2.2.1 Introduction

There is a long history of seabird harvesting in Canada dating back thousands of years to early colonization by indigenous peoples of coastal areas in the Arctic, Pacific, and Atlantic regions. On the Atlantic coast, seasonal fishermen and settlers from Europe established, or brought with them, a seabird hunting tradition which has continued to the present. Historically, seabirds were an important component of the subsistence way of life for coastal peoples and provided meat for human food, dog food, fish bait, oil, feathers, and skins for clothing. Eggs were also routinely harvested for human consumption. With the advent of migratory bird protection in North America dating from early this century and shifts away from subsistence living, consumptive use of seabirds has declined. Today, seabird harvesting, whether for birds or eggs, is much less widespread, although improvements in hunting efficiency (better guns, ammunition, and boats) have tended to increase harvests for species such as murres.

Seabird harvests in Canada mainly involve auks and eiders. These species are legally harvested by Native peoples in all coastal regions of Canada. Eiders are hunted by non-Native people mainly in Atlantic Canada. In Newfoundland and Labrador, residents legally hunt thick-billed and common murres. Several species of seabirds are taken illegally by non-Native people mainly in Newfoundland and Labrador and in Québec on the north shore of the Gulf of St. Lawrence. Egging is most common in the Arctic where Native people harvest the eggs of auks (legal), and gulls, terns, and eiders (technically illegal). Egging elsewhere is not a common practice, although common eider colonies in Labrador may still be impacted. The extent of seabird harvest by Native people in the interior of Canada is unknown at present.

2.2.2 Regulation of the seabird harvest in Canada

All Canadian seabirds, with the exception of cormorants, are considered migratory birds and as such are protected under federal legislation. Cormorants are protected by provincial legislation. Protection of migratory birds in Canada is accomplished through regulations set out in the Migratory Bird Convention Act (MBCA) of 1917, which brought into law provisions of the Migratory Bird Convention (MBC), a treaty signed by the United States and the United Kingdom on behalf of Canada in 1916.

In the MBCA all seabirds with the exception of eiders are classified as migratory nongame birds and are protected from hunting all year. Native people are exempt from this restriction and at any time are allowed to take various auk species and scoters for human food and clothing. Eiders are classified as migratory game birds and a strictly controlled annual hunt is allowed for Native and non-Native people. Migratory game bird hunters must purchase a migratory game bird hunting permit annually. Native people are exempt from this requirement. It is illegal to take the eggs of any migratory bird in Canada; however, Native people are allowed to take the eggs of auks.

Before Newfoundland joined Canada in 1949, murres and other seabirds could be legally hunted by Newfoundland residents. After confederation, Newfoundland came under Canadian law, which suddenly meant that migratory nongame birds such as auks and gulls could not be hunted. After much negotiation, a special regulation was added to the MBCA which allowed residents of the province of Newfoundland and Labrador to hunt murres in that province only. More recently, the MBC itself has been amended to allow for the special case of a murre hunt in Newfoundland and Labrador. Until 1993, murres could be hunted between 1 September and 31 March with no restrictions on the number taken and with no permit requirement. Since then, hunting restrictions have been imposed which limit the daily bag to 20 birds and 40 in a hunter's possession, and which shorten the hunting season to a little over three months in the four hunting zones. There is still no permit requirement for Newfoundland murre hunters.

The MBCA specifies that it is illegal to sell migratory birds in Canada, so "market hunting" is not allowed. Migratory game birds and murres can be given away if taken legally.

Cormorants are under the jurisdiction of the 10 provinces of Canada and the level of protection varies considerably across the country. In many places, cormorants are considered pests because of the perception that they consume significant quantities of valuable commercial fish. For example, open hunting seasons on cormorants are, or have been, in place in the Maritime provinces of Nova Scotia, Prince Edward Island, and New Brunswick for population control.

2.2.3. Locations, species, and numbers of seabirds harvested in Canada

There is no comprehensive scheme within Canada to monitor seabird harvests, however, some information is available for local areas or particular species. Because eiders are game birds, their harvest is monitored on an annual basis by the Canadian Wildlife Service (CWS). Also, periodic, special surveys are conducted to assess the murre harvest in Newfoundland and Labrador. Information on seabird harvest on the Québec North Shore dating from the early 1980s is available as a result of an education project conducted in the area by the Québec-Labrador Foundation (Blanchard 1984, 1994). Quantitative data are generally scant for the Northwest Territories and Nunavut, although a recent Native harvest survey conducted in Nunavut will provide valuable information for that region.

Arctic and northern Canada

The common eider, thick-billed murre, and black guillemot are the most commonly harvested seabirds in Arctic Canada (Wong 1985; Gamble 1987a, 1987b; Donaldson 1988). These species are part of the Native diet wherever they are available; however, they are most commonly hunted by people who live close to seabird concentrations such as breeding colonies. Important seabird harvesting communities in Arctic Canada are Cape Dorset, Lake Harbour, Pond Inlet, Ivujivik, Pangnirtung, and Sanikiluaq (Brown et al. 1975, Donaldson 1988).

The eider harvest is assessed by the CWS annually across Canada, using a mail-out survey to purchasers of migratory game bird hunting permits (Lévesque et al. 1993). This method severely underestimates actual harvest in the Arctic because relatively few people living there are required to purchase such a permit and thus the hunter base is unknown. Other surveys of wildlife harvests in the Arctic suggest that common eiders are the most commonly hunted seabird there. Donaldson (1988) estimated that about 11,000-15,000 birds were harvested each year in the Baffin region (Ellesmere Island to islands off northern Québec including Belcher Islands in

Hudson Bay) with Sanikiluaq in southern Hudson Bay, and Cape Dorset being the most important communities for eider hunting.

Numbers of murres taken per year in the Arctic are relatively small. The estimated annual harvest of thick-billed murres at Cape Dorset varied from 619 birds in 1983 to 1,330 birds in 1982. The annual harvest for Lake Harbour varied from 242 in 1983 to 500 in 1981 (Donaldson 1988). Gaston et al. (1985) estimated that up to 2,000 murres were taken annually at the Digges Sound colonies by hunters from Ivujivik. Sanikiluaq in the Belcher Islands, Hudson Bay, is an important community for black guillemot harvest; however, the annual harvest is small, ranging from 60 birds in 1981 to 468 birds in 1983 (Donaldson 1988).

The total annual seabird harvest in Arctic Canada is difficult to estimate but is probably less than 25,000 birds of which about half are common eiders. Donaldson (1988) estimated about 15,000 birds were taken annually in the Baffin region communities of Arctic Canada, approximately 80% being common eiders, 13% thick-billed murres, and the remainder black guillemots. An additional 2,000 murres per year are taken by the community of Ivujivik in northern Québec (Gaston et al. 1985). Based on the level of public interest and concern for their conservation, it is clear that eiders are by far the most popular seabird taken by Native people in Arctic Canada (G. Gilchrist, pers. comm.).

The harvest of seabird eggs in Arctic Canada is not as widespread as bird hunting and usually involves ground nesting common eiders, Arctic terns, and *Larus* gulls (Wong 1985). Thick-billed murre eggs are collected from accessible locations at the Digges Sound colonies by Native people from Ivujivik (Gaston et al. 1985) and at the Cape Graham Moore colony on Bylot Island by residents of Pond Inlet (A. J. Gaston, per. comm.). Egging at Cape Graham Moore may be the most regular seabird harvest that occurs in the Arctic as people visit annually and make use of climbing ropes fixed permanently to the cliff (A. J. Gaston, pers. comm.). Little data exists on the level of seabird egg harvesting in the Arctic but it appears to be low (Wong 1985). About 2,000-3,000 murre eggs are collected annually from Digges Sound colonies (Gaston et al. 1985), and "several thousand" are taken from the Cape Graham Moore colony annually (A. J. Gaston, pers. comm.).

Information on seabird harvesting by Native people across the interior of northern Canada could not be found. Ground nesting seabirds such as gulls, terns, and jaegers breed in this region, and it is likely that Native people make some use of these birds. Seabirds do not appear to be harvested in the Ontario portion of Hudson and James Bay lowlands (Berkes et al. 1994).

Atlantic Canada

Seabird harvesting in Atlantic Canada takes place mainly in Labrador, insular Newfoundland, and the Québec North Shore. Eiders are hunted in the maritime provinces of Nova Scotia and New Brunswick. Mainly non-Native people hunt seabirds in insular Newfoundland, the Québec North Shore, and the Maritimes, while both Native and non-Native people do so in Labrador.

The murre hunt in Newfoundland and Labrador

By far the largest and most significant consumptive use of seabirds in Canada occurs in Newfoundland and Labrador where thousands of hunters legally take thick-billed and common murres (locally known as "turrs") during the winter. Murres are shot in inshore areas and bays from small boats (Elliot 1991).

The size of the annual murre harvest has been estimated several times over the past 40 years. Early estimates by Tuck (1961) suggested that about 200,000 murre, mainly thick-bills were harvested annually. More recent estimates in the late 1970s through 1980s, when hunting restrictions were not in place, indicated an annual harvest of 600,000-900,000 birds of which 95% were thick-billed murre (Elliot et al. 1991). Starting in September 1993, restrictions in the form of bag and possession limits, and shorter hunting seasons, were put in place to reduce the harvest by half. Since that time, three murre harvest surveys have been conducted, which show that the annual harvest has been reduced substantially to about 200,000-300,000 birds per year (Chardine et al. 1999). Observations from the thick-billed murre colony at Coats Island suggest that the number of young birds and potential recruits has increased substantially since the hunting restrictions were imposed, although other hypothesized impacts of reduced harvest have not been observed (A. J. Gaston, in prep.).

Prior to the advent of hunting restrictions, it was estimated that one in three murre taken in Newfoundland and Labrador was illegally sold or bartered in an "underground" market (Elliot 1991). This proportion probably declined as a result of the hunter liaison and education program conducted in the early 1980s (Elliot 1991) and has likely declined further now that hunting restrictions are in place. Nevertheless, it is still considered a motivating factor in over-hunting by some individuals.

Eider hunting in Atlantic Canada

Eiders are popular game birds throughout Atlantic Canada, particularly in Newfoundland and Labrador, Nova Scotia, and the Gulf of St. Lawrence, Québec. Very few king eiders (*Somateria spectabilis*) are killed (Wendt and Silieff 1986, Lévesque et al. 1993) and the following comments apply to the common eider. Estimates of the eider harvest in eastern Canada vary widely and it is difficult to provide a definitive number. Special surveys of the sea duck harvest in Newfoundland and Labrador in the late 1970s suggested an annual harvest for all species of over 100,000 birds, of which an estimated 75,000 were common eiders. National harvest surveys during the same period estimated eider harvests in the order of 15,000 per year (Wendt and Silieff 1986).

More recent national harvest surveys suggest that about 20,000 eiders were harvested annually in Atlantic Canada from 1988-1991 (Lévesque et al. 1993) with about 43% killed in Newfoundland and Labrador, 41% in Nova Scotia, 12% in Québec, and 3% in New Brunswick. Northland Associates (1986) estimated that more than 30,000 eiders (probably common eiders) were harvested on the Labrador coast alone in 1980. Some of these figures may underestimate the true level of harvest for Atlantic Canada. Poaching is widespread in the region, and poached birds are unlikely to be reported. Many people in Labrador are not required to buy a hunting permit because of their Native status and so would not be counted in the hunter base. Furthermore, national harvest surveys are conducted too early in the year to assess the eider harvest effectively.

Common eiders breed in many parts of Atlantic Canada and eggging was probably widespread in the past. Eider colonies on the coast of Labrador were probably heavily egged by seasonal fishermen arriving for the summer fishery. This has likely diminished with the reduction in ground fish fishing activity on the east coast of Newfoundland and Labrador since 1992.

Other seabirds

In Labrador, some coastal Native people legally hunt Atlantic puffin (*Fratercula arctica*), dovekie, razorbill (*Alca torda*), and black guillemot (Northland Assoc. 1986). In addition, non-

Native people in Labrador, insular Newfoundland, and the Québec North Shore illegally harvest these and other species such as shearwaters (*Puffinus* spp.), large *Larus* gulls, black-legged kittiwakes, and terns (*Sterna* spp.) (Northland Assoc. 1986, Blanchard 1994, CWS unpubl. files). Seabird eggs are collected for food in Labrador and on the Québec North Shore. Egg collecting is uncommon in insular Newfoundland.

Little quantitative information is available on the size of these harvests. Northland Associates (1986) estimated that about 17,000 black guillemots were taken in 1980 on the whole Labrador coast. Given estimates of guillemot populations in this region (e.g., Nettleship and Evans 1985), the estimate appears high; however, it may also indicate that the number of guillemots in the area is an underestimate. This report also provides estimates of other seabird harvests (in autumn) on the Labrador coast as follows: razorbills >4,000 birds, dovebies >2,000 birds, Atlantic puffins >6,000 birds, and black-legged kittiwakes about 1,000 birds.

There are no data on the harvest levels of seabirds other than murres and eiders in insular Newfoundland. It is well known that hunters take razorbills, Atlantic puffins, dovebies, and black-legged kittiwakes despite enforcement efforts and the common knowledge that these activities are illegal. Of particular concern is that an unknown but perhaps significant number of razorbills is taken (either purposely or accidentally) during the Newfoundland murre hunt.

On the Québec North Shore, local harvest levels were considered large enough to have reduced seabird populations in the area. In a survey of the 1981 hunting season conducted by Blanchard (1984), respondents identified herring gull as the most commonly collected egg, black guillemot as the most commonly harvested chick (presumably fledglings), and common eider as the most commonly hunted adult seabird. A program to inform and educate the local population of the Québec North Shore appears to have reduced seabird harvest in that area and allowed local populations to increase (Blanchard 1994).

2.2.4. Cultural significance of the seabird harvest in Canada

No objective analysis of the cultural significance of seabird harvesting in Canada is available; however, general comment is possible. Seabirds are taken widely by Native people across Canada, but probably nowhere do they form a significant portion of the diet on an annual basis (e.g., Gamble 1987a, 1987b). It is likely that at most locations seabirds are taken opportunistically by Native people while carrying out other hunting activities (G. Gilchrist pers. comm.). There are, however, a few communities in the Arctic where seabird hunting trips are purposely made to local murre or eider colonies.

In Labrador, insular Newfoundland, and the Québec North Shore, seabird hunting remains a very popular activity. In Newfoundland, the number of murre hunters was estimated to be over 10,000 (Elliot et al. 1991) and about 30% of these also hunt eiders (CWS unpubl. files). More recently, the number of murre hunters in Newfoundland and Labrador has likely declined (Chardine et al. 1999) as has the number of migratory game bird hunters. Historically, seabirds provided a ready and abundant supply of fresh meat, particularly welcome during the winter months when alternative fresh foods were limited. A holdover to this subsistence way of life remains today and seabird hunting is considered a "right" by many people. The murre harvest in Newfoundland and Labrador provided an estimated 300 metric tons of meat annually (assuming 400 g of meat per bird) before hunting restrictions were put in place, and about half that now (CWS unpubl. files). It is easy to see the importance of this harvest to the people of Newfoundland. The CWS

recognizes the cultural significance of the murre hunt to Newfoundlanders and is committed to maintaining a sustainable hunt into the future.

2.2.5 Public outreach programs aimed at seabird harvesting in Canada

Programs to reduce seabird harvesting in Canada have been aimed at illegal hunting and selling of birds and at unsustainable harvests. The Québec-Labrador Foundation mounted an information, education, and enforcement program in co-operation with the CWS on the Québec North Shore in 1978 (Blanchard 1994). There, illegal and widespread hunting was thought to be a factor contributing to population declines of seabirds in the area. The program was considered a success because the desired results were achieved: (1) seabird population increases, (2) enhanced local knowledge and attitudes towards wildlife regulations, (3) decline in illegal harvest, and (4) increases in support and participation by residents in the seabird management program. The lasting benefits of this program remain to be determined (K. Blanchard, pers. comm.).

In Newfoundland and Labrador, enhanced communication and consultation with seabird hunters began almost 20 years ago (Elliot 1991). This program focused mainly on the very large harvest of murres and the widespread problem of selling birds. It involved repeated visits to 175 coastal communities by seabird experts and emphasized mutual respect and two-way communication of sound biological and conservation principles between resource managers and hunters. Although the effects of the program have not been measured systematically, it is generally felt that it was very successful (R. D. Elliot pers. comm.). Subsequent to the program, increasing numbers of hunters called for murre hunting restrictions in the form of a bag limit. Recently, hunters were directly involved with the CWS in the establishment of the new hunting restrictions. High levels of compliance with the new restrictions together with positive comments from the majority of hunters suggest that a reduced harvest and hunting restrictions are strongly supported.

2.2.6 Recommendations to improve management of the seabird harvest in Canada

- Improve knowledge of the level of the seabird harvest and the species concerned, focusing initially on regions where the harvest is thought to be substantial and little information currently exists. A priority is to gather this information for razorbills and Atlantic puffins hunted in Newfoundland and Labrador, and for all seabird harvests in the Arctic.
- Regularly monitor the annual harvest of murres in Newfoundland and Labrador.
- Require a permit to hunt murres in Newfoundland and Labrador so that more accurate harvest estimates can be made.
- Periodically review the sustainability of the Newfoundland and Labrador murre hunt and make adjustments to hunting restrictions as appropriate.
- Closely monitor populations of heavily harvested species such as thick-billed murres and common eiders at the breeding colonies and in over-wintering areas.
- Where illegal and/or unsustainable seabird harvest occurs, or where the sale of seabirds is common, mount information/education and enforcement programs to reduce or eliminate these activities. Use as models either the Québec-Labrador Foundation program in Québec North Shore (Blanchard 1984) or the CWS Newfoundland program (Elliot 1991) as appropriate. The razorbill harvest in Newfoundland and Labrador and the illegal sale of murres and eiders in insular Newfoundland are priorities.

2.3 REVIEW OF THE HUNTING REGIME OF SEABIRDS IN FINLAND

by Martti Hario

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2.3.1 Locations where seabirds are harvested

Today, hunting is the only means of taking seabirds in Finland. Although egging of common mergansers is still allowed in the Åland Islands, it has practically ceased. The Åland Islands form an autonomous region in the southwest archipelago. Ninety-nine percent of the people speak Swedish and the region has its own hunting act. On the Finnish side of the archipelago, egging has been banned since 1962. Formerly, it played an important role in regulating the population sizes of eiders and alcids.

Potentially, hunting occurs throughout the archipelago (which comprise 73,000 islands of >5 ares [500 m²] in size) along the entire coastline (4,600 km long), with the exception of bird sanctuaries and national parks (810 km² or 3% of the total archipelago area of 24,000 km²). Game, however, belongs to the landowner and most of the archipelago is private land. Nonhunting landowners or administrators commonly prohibit hunting on their property. As all shooting is land-based (hunting from motorboats is prohibited), there are always large hunting-free areas in addition to the sanctuaries and parks.

2.3.2 Which species are hunted

Only shooting is allowed (no trapping), and nests and chicks are always protected. Most seabirds, including alcids, are protected by the Nature Conservation Act. There are no hunting traditions for loons (divers), jaegers (skuas), waders (excluding snipes), terns, or alcids in Finland.

Game species such as eiders, oldsquaw (long-tailed duck), common merganser (goosander), and red-breasted merganser are protected by the Hunting Act. Open season for male eiders spans from 1 June – 31 December, for female eiders 20 August – 31 December, for oldsquaw and mergansers 10 September – 31 December. The strictly licensed spring shoot (*see 2.3.7*) uses various open seasons.

In the Åland Islands, the hunting season in autumn spans 1 September – 31 December for the sea ducks mentioned above except for eider which is only hunted in spring.

2.3.3 Numbers of birds harvested

Annual mean bags in Finland (Åland Islands excluded) in 1991-97 were as follows: eiders (27,500), oldsquaw (39,000), and mergansers (23,000). Current population estimates are: eiders (150,000-200,000 pairs), and mergansers (21,000 pairs). The oldsquaw is a transient migrant and has no permanent breeding population in the Finnish archipelago, but some 3,500 pairs are breeding in northernmost Lapland. The harvested population consists of migrants from northern Russia.

The mean annual harvest of all waterfowl in 1991-97 was 827,000 individuals. Thus, with the 89,500 harvested individuals, sea ducks represent 11% of the total waterfowl harvest on the Finnish side of the archipelago. In the Åland Islands this share is far larger, 75-80%.

The harvest of eiders paralleled the species' population trend on the Finnish side of the archipelago until 1981 (with an almost 10% increase per year); thereafter no correlation between harvest data and population trends is discernable. The harvests have been increasing during the 1990s and peaked in 1993, while the population growth has gradually slowed and locally ceased altogether. The current population trend is unstable or slowly decreasing.

In Sweden, there is no apparent trend in eider harvest size from 1960-90. In Denmark, harvests increased until 1983 and thereafter stabilized or slightly decreased (as a whole, eider harvests in Denmark are 5-10 times larger than in Finland). Nevertheless, Danish hunters did not keep pace with the increasing shooting opportunities (i.e. the 10% annual increase in eider populations in the Baltic Sea) (Hario and Selin 1987, Noer et al. 1995). This contributed to the tremendous increase in eider populations in the Baltic Sea in 1970-85. The 130,000-140,000 birds taken annually in Denmark were estimated to comprise 6.5-9.5% of the total wintering stock there (Noer et al. 1995).

Though the present harvest of sea ducks is not considered too large, the situation may be changing due to the increasing level of eutrophication in the Baltic Sea. This could gradually reduce the recruiting stocks of sea ducks due to adverse changes in the birds' feeding ecology.

2.3.4 Who can hunt sea ducks

Every licensed hunter can hunt sea ducks provided that he or she has permission to use the land for hunting purposes. A licensed hunter is a resident, 15 years old or older, who has passed the hunter's examination and paid the annual game management fee. There are nearly 300,000 licensed hunters in Finland (70% are wildfowlers). Of the 12,000 inhabitants on the Finnish side of the archipelago about 2,000 are licensed hunters. Shooting rights are bound to landownership. One can lease shooting rights from a landowner, however. Today, about one third of the eiders are harvested by tenant hunters.

2.3.5 Cultural and economic significance of hunting

Several studies exist on the socioeconomic aspects of hunting in the archipelago (Storå 1968). Harvesting eggs formerly was an essential part of the exploitation of seabirds in the Finnish archipelago. It probably had severe negative effects on the eider population size because eiders seem to be less suitable for eggging than most other Anatidae (Hario and Selin 1984).

Today, there is no commercial value in seabird hunting: selling harvested birds is not allowed, and hunting is "recreational shooting" only. An imaginary value can be calculated, however, based on the quantity of game meat derived from mean quarry size. The value of harvested sea ducks (about 3 million Finnish marks) comprises 10% of the total value of all wildfowl. As most game meat in Finland is from moose and other mammals (ungulates and lagomorphs), the calculations based on kilograms don't amount to a great value for harvested game birds despite the high number of individuals.

2.3.6 How hunting is regulated

As in most European countries, hunting in Finland is regulated by legislation and common practices. Compared to non-migratory game, however, hunting of waterfowl is less strictly regulated (e.g., tetraonids and several mammals have official bag limits in addition to varying open seasons). Official bag limits are set for waterfowl only for the spring shoot, although local hunters' associations are free to limit harvests in their hunting areas (e.g., by means of shortening the open season).

Several restrictions in hunting techniques are included in the Hunting Act, aimed to protect waterfowl from over-shooting or to increase the sporting character of hunting (Lampio 1974). So far, harvesting has been on a sustainable level and sufficiently regulated in terms of keeping populations stable or allowing them to grow.

2.3.7 Spring shoot of sea duck males - a peculiarity of Finnish hunting

The spring shoot during 10 April – 21 May is open to 1,890 resident hunters living permanently on the Finnish side of the archipelago. They use 998 sites (islets) forming a total area of 35 km² or 0.15% of the total archipelago area.

In the Åland Islands, approximately 3,700 resident hunters are allowed to participate in a spring shoot from 15 March – 25 May, with a break during 16 April – 1 May, depending on the target species.

The Finnish spring shoot harvests 7,000 eider males per year (5-8% of the male population), 1,100 merganser males (4-6%) and 6,000 oldsquaw (of both sexes). In the Åland Islands, there are a few additional species that can be hunted in spring such as the white-winged scoter (velvet scoter, *Melanitta fusca*) and the tufted duck (*Aythya fuligula*). Quotas are set at a total of 56,000 birds. In 1999, the final bag was 30,182 birds, i.e. roughly half the size of the quota (comprising 2,000 oldsquaws, 7,800 eiders, and 8,600 scoters, a.o.). While on the Finnish side of the archipelago the spring shoot contributes less than 10% to the total annual sea duck harvest, in the Åland Islands it contributes more than 90%. These figures refer to sea ducks, not to all waterfowl.

A study on the effects of the spring shoot on eiders (Hario et al. 1995) revealed that removal of the male results in a 40% loss in the individual female eider's hatching success compared to her previous life-time success (this only refers to those that choose to breed as widows; one third of widows skip breeding). This difference stems from the increasing rate of unfertilization, 30% of eggs being addled (against a mean of 11% for the same females in previous years). The parentage of addled eggs cannot be resolved, but DNA fingerprinting in this study revealed that 19% of viable eggs were parasitic. Among breeding widows, sperm duration (1-20 days) and ejaculation success (0-100%) varied greatly. Breeding widows were able to produce only 1-3 eggs of their own. Because their mean clutch size did not decline, it is assumed that nonbreeding widows were parasitizing their nests by depositing their unfertilized/fertilized eggs in them. Thus, removal of males during spring shoots lowers the fecundity of breeding widows and increases the rate of nonbreeding and the consequent parasitic laying. In no case did a widowed female have extra-paternal progeny in her own eggs, indicating that after clutch initiation widowed females do not re-pair nor engage in extra-pair copulations. Thus, the re-pairing potential in a harvested eider population in spring may be much lower than previously thought.

So far, the spring harvest has not adversely affected local population trends. Nothing, however, is known of the state of the oldsquaw populations subjected to spring shooting in Finland while on migration to Siberia. Considering the relatively small bags (about 10,000 birds) there is hardly any detrimental impact on the total Baltic Sea wintering stock of more than 4 million oldsquaws (Durinck et al. 1994).

2.3.8 Recommendations to improve the management of sea duck harvests

To improve management of seabird harvest regimes Finland recommends.

- Investigate the factors causing variations in recruitment rates of game species in the marine environment.
- Conduct hunting studies.

2.4. SEABIRD HARVEST IN GREENLAND

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2.4.1 Introduction

There is a long history of seabird harvests in Greenland dating back thousands of years. In the small and often isolated coastal settlements, seabirds were harvested as a necessary food supply or for their down or skins. Today seabirds still play a key role in Greenland subsistence hunting. Growth of the human population, better guns, and faster boats have increased the harvest for several species during the last hundred years. Some people regard seabird harvesting as a right not to be tampered with because of its long tradition.

2.4.2 Existing regulations of the seabird harvest in Greenland

Until 1978, hunting regulations in Greenland were chiefly the responsibility of local authorities and they differed among districts (Evans and Kampp 1991). In May 1988, a new executive order on the protection of birds was passed, introducing stricter regulations. In 1989, the Greenland Home Rule Authority made some small alterations to the regulations which are still in force (Executive Order No. 20, 19 September 1989). According to this executive order, all birds are protected. There is an open season for 26 species (Tables 4 and 5), including Arctic tern, for which only egging is allowed.

For nine species, special closed seasons are in force. The restrictions for these species are divided geographically and in some areas hunting is allowed all year (Tables 4 and 5). Generally, the harvest time is longest in North and East Greenland where the birds arrive very late during the spring and where the human population is sparse. For example, it is legal to take auk species such as murres and dovebies all year (Tables 4 and 5) in Ittoqqortoormiit and Aversersuaq.

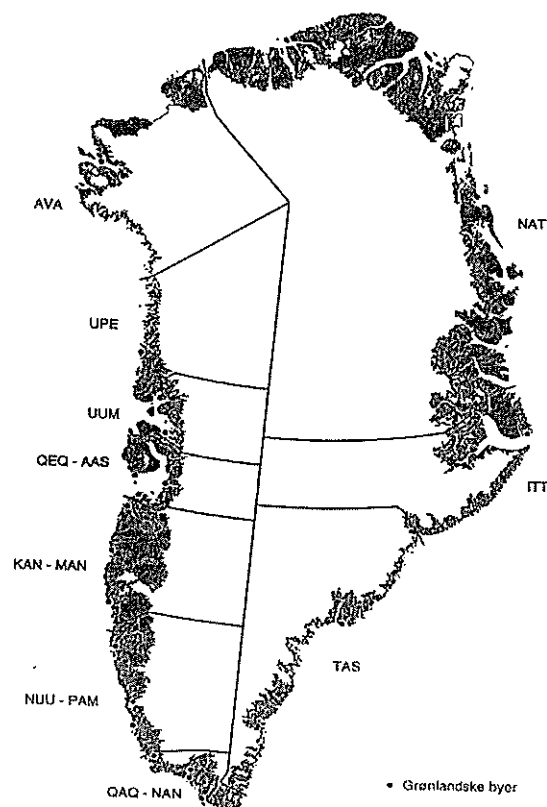


Figure 2. Map of Greenland with names of municipalities mentioned in text

Harvest of eggs is not allowed although subsistence harvest of eggs from parasitic jaegers, Arctic terns, northern fulmars, great black-backed gulls, Iceland gulls, glaucous gulls, black-legged kittiwakes, black guillemots, and dovebies is allowed until 1 July. Furthermore, in Avanersuaq and Ittoqqortoormiit Municipalities, it is permitted to collect eider eggs and down until 25 June.

Bird hunting is open to all Greenlanders with a hunting license. Licensing requires registration with the local municipality and paying a small fee (ca. \$6 US). There are two kinds of hunting licenses: professional and leisure-time. All Greenlanders with a permanent address in Greenland are allowed to get a leisure-time hunting license. People with citizenship in another country are considered Danish citizens after having permanently resided in Greenland for two years. Persons whose primary income is from hunting and fishing have a right to get a professional hunting license.

It is legal to shoot birds during the hunting season (for personal use and local sale) for both leisure-time and professional hunters. In some municipalities, only professional hunters are allowed to use the local outdoor market called *brættet* (*the board*) to sell their harvest. Leisure-time hunters are allowed to shoot a maximum of 10 murres per hunting trip and only for their own consumption, whereas professional hunters are allowed to harvest and sell (at the local open air market) an unlimited number of murres during the hunting season (Table 5).

Hunting statistics have been compiled since 1993. A hunting license is renewed only if an annual hunting report has been forwarded by the individual hunter. If a hunter does not send in the annual report, he has to re-register with the municipality to get a new license.

The hunting statistics quantify the taking of birds (and mammals) but not of eggs. Harvest of the following seabird species has been described: murre spp., black guillemot, king and common eider, kittiwake, and dovebie.

Murres and eiders are the most commonly harvested seabirds in Greenland today and probably always were. Other seabirds, such as dovebies and kittiwakes, are also harvested frequently in certain regions of the country.

Table 4. Hunting regulations for seabirds in Greenland.

(Hunting is forbidden in the National Parks in North and East Greenland, and in the Nature Park in Melville Bay. Bird species not mentioned in this table are protected all year.)

Species English Name	Species Latin name	Area	Open season
Common loon	<i>Gavia immer</i>	The whole country	16 Aug - 31 May
Red-throated loon	<i>Gavia stellata</i>	The whole country	16 Aug - 31 May
Northern fulmar	<i>Fulmarus glacialis</i>	The whole country	16 Aug - 31 May
Great cormorant	<i>Phalacrocorax carbo</i>	The whole country	01 Oct - 31 Mar
Greater white-fronted goose	<i>Anser albifrons</i>	The whole country	16 Aug - 30 Apr
Pink-footed goose	<i>Anser brachyrhynchus</i>	In the municipality of Ittoqqortoormiit. Exception: There is no prohibition on hunting migrating birds along the edge of the ice from 1 Sept - 1 July Rest of the country	01 Sep - 31 May 16 Aug - 30 Apr
Barnacle goose	<i>Branta leucopsis</i>	In the municipality of Ittoqqortoormiit. Hunting of migrating birds along the edge of the ice is allowed in the period of 1 Sept - 1 July Rest of the country	01 Sep - 31 May 16 Aug - 30 Apr
Mallard	<i>Anas platyrhynchos</i>	The whole country	16 Aug - 31 May
Oldsquaw	<i>Clangula hyemalis</i>	The whole country	16 Aug - 31 May
Common eider	<i>Somateria mollissima</i>	North of Kangatsiaq Rest of the country	16 Aug - 31 May 01 Oct - 31 May
King eider	<i>Somateria spectabilis</i>	The whole country	16 Aug - 31 May
Red-breasted merganser	<i>Mergus serrator</i>	The whole country	16 Aug - 31 May
Rock ptarmigan (grouse)	<i>Lagopus mutus</i>	The whole country	16 Aug - 31 May
Parasitic jaeger (Arctic skua)	<i>Stercorarius parasiticus</i>	The whole country	16 Aug - 31 May
Pomarine jaeger (skua)	<i>Stercorarius pomarinus</i>	The whole country	16 Aug - 31 May
Long-tailed jaeger (skua)	<i>Stercorarius longicaudus</i>	The whole country	16 Aug - 31 May
Great black-backed gull	<i>Larus marinus</i>	The whole country	16 Aug - 31 May
Glaucous gull	<i>Larus hyperboreus</i>	In Ittoqqortoormiit and Avernarsuaq Rest of the country	All year 16 Aug - 31 May
Iceland gull	<i>Larus glaucoides</i>	The whole country	16 Aug - 31 May
Black-legged kittiwake	<i>Rissa tridactyla</i>	The whole country	16 Aug - 31 May
Dovekie	<i>Alle alle</i>	In Ittoqqortoormiit and Avernarsuaq Rest of the country	All year 16 Aug - 31 May
Thick-billed murre (Brünnichs guillemot)	<i>Uria lomvia</i>	(Table 5)	(Table 5)
Common murre (guillemot)	<i>Uria aalge</i>	(Table 5)	(Table 5)
Black guillemot	<i>Cephus grylle</i>	The whole country	16 Aug - 31 May
Common raven	<i>Corvus corax</i>	In Ittoqqortoormiit and Avernarsuaq Rest of the country	All year 01 Aug - 31 Mar

Table 5. Hunting periods for common and thick-billed murres in Greenland.

Area	County	Open season
North and Northwest Greenland	Avanersuaq	All year
	Upernavik, Uummannaq, Qeqertarsuaq, Ilulissat and Qasigianniguit	01 Sep - 31 May
Southwest Greenland and South Greenland	Aasiaat, Kangaatsiaq and Sisimiut, Maniitsoq, Nuuk, Paamiut, Ivittuut, Narsaq, Qaqortoq, and Nanortalik	16 Oct - 14 Mar
East Greenland	Tasiilaq	16 Oct - 14 Mar
	Ittoqqortoormiit	All year

Trade of harvested murres is allowed at the local outdoor market. No commercial production or freezing is allowed (exemptions can be made). Leisure-time hunters are allowed a maximum of 10 murres per hunting trip and only for their own consumption. Professional hunters may shoot an unlimited number.

2.4.3 Harvest of murres in Greenland

For at least the last 50 years, the harvest of murres has been described very well, and considerable information is available on the murre hunt in Greenland. Information about the harvest of other seabirds is limited.

Common and thick-billed murres are the best surveyed seabird species in Greenland. Since the beginning of the 1980s, these two species have been the subject of intense research (Kampp et al. 1994). There are several colonies on the west coast of Greenland but only two on the east coast near Ittoqqortoormiit.

Thick-billed murres are the most abundant and widespread of the two species. The total Greenlandic breeding population of thick-billed murres is estimated at 535,000 birds present, roughly equivalent to 375,000 breeding pairs (Kampp et. al 1994). Fifty-three percent of the total Greenlandic population is found in Avanersuaq and 40% south of Melville Bugt (Boertmann et. al 1996).

Traditionally, murres in Greenland were hunted whenever available, depending on the region. They have probably been harvested for several thousand years in Greenland but it is unlikely that the harvest had any great impact until the 20th century. The communities were small and hunting was done from kayaks. In this century, the human population has increased rapidly and motorboats and shotguns have been introduced as tools for hunting almost everywhere in Greenland. Furthermore, Müller (1906) describes that in accordance with the strong decrease in the eider population in the 19th century, murres became the most important birds in Inuit subsistence hunting all over the west coast of Greenland. Therefore, human impact on murres must have increased greatly during the 20th century and many formerly large colonies have decreased drastically.

Numbers of common murres harvested compared with thick-billed murres

The common murre is a very scarce breeder in Greenland (1,500-2,000 individuals) (Boertmann et al. 1996) and has probably always been. Frich (1997b) has shown that the amount of common murres harvested only made up 0.1% compared with thick-billed murres during the winter-hunt

in Southwest Greenland in 1995-1996. Common murres are often found with thick-billed murres, and West Greenland hunters do not discriminate between the two species. There is no reason to believe that the harvest of common murres is more intense in other parts of the country.

Harvest in South and Southwest Greenland

There are big differences in the traditions and hunting methods for murres between Northwest and Southwest Greenland because of migration patterns. Thus, different murre populations are exploited in the various regions of Greenland (Table 6).

Huge numbers of thick-billed murres from Spitsbergen, Arctic Canada, and Northwest Greenland winter in the open waters in Southwest Greenland from Sisimiut or Manitoq and southwards (Falk and Durinch 1992). In these regions, murres have always been a very important meat supply during the autumn and winter.

Since 1988, the open season for murre hunting in Southwest and central West Greenland has been from 16 October – 14 March. In contrast to the professional hunters who shoot murres as long as weather and regulations permit, the private hunters usually stop hunting before the end of the year. Most birds therefore are killed during the autumn (Falk and Durinck 1990).

In central West Greenland (Sisimiut in the north to Nuuk in the south), the proportion of older birds increases significantly during the hunting season from less than 30% in October to more than 75% in March. In contrast, only a very small proportion of the harvest in South Greenland is older birds and the proportion does not increase during the winter, a pattern confirmed over several winters (Falk and Durinck 1990, 1992; Frich 1997b, 1997c). Generally, the main proportion of birds shot is juvenile birds (Falk and Durinck 1990, 1992; Kampp 1991; Frich 1997e). Kampp (1991) estimated the proportion of first year birds, older immature birds, and adults shot in the winter to be 71:19:10, whereas Falk and Durinch (1992) found the corresponding values to be 56:18:26.

Since 1990, each year the Home Rule Government has granted permission for limited commercial production of murres in settlements and small towns in South Greenland municipalities (Frich 1997b). Hunters in these municipalities sold on an average 18,227 murres each year to the processing companies. In previous years (before the executive order in 1988), the number of birds processed was much higher, totaling 93,000 in the winter 1986-1987 (Falk and Durinch 1992). Such commercially produced murres can be bought frozen in supermarkets all over Greenland.

Table 6. *Exploitation of murre populations in different areas of Greenland as a result of murre migration patterns.*

Part of Country	Resident breeding birds	Greenlandic migrants	Canadian migrants	Norwegian migrants	Icelandic migrants
North Greenland	X				
Northwest Greenland	X	X	?		
Southwest Greenland		X	X	X	?
South Greenland				X	X
East Greenland	X	?		?	?

In North, Northwest, and East Greenland resident breeding birds are harvested during spring and early summer. In Southwest Greenland a combination of migratory birds from North Greenland, Northwest Greenland, Canada, and Norway are harvested. In South Greenland, Norwegian migratory birds are harvested. Sources: (Frich 1997a, Lyngs, pers comm.).

Harvest in North, Northwest, and East Greenland

In North and Northwest Greenland (from the Disko region and northwards), murres are only available for hunters in the spring and summer, and there is a tradition for hunters to exploit local breeding birds. Similarly, two colonies in East Greenland have always been exploited during the breeding period.

To prevent a decrease in the murre breeding population, a closed season (1 June – 31 August) north from Kangatsiaq Municipality was introduced by the revised executive order in 1988 and 1989. Furthermore, according to this Order, it is prohibited to shoot or create a disturbance within 5 km of cliffs inhabited by thick-billed murres. In the first years after the revised executive order was introduced, the hunters in some of the districts in Northwest Greenland had been granted exemptions and obtained a prolonged hunting season. This exemption has not been given since 1994. Due to the very small settlements in Avanersuaq and Ittoqqortoormiit, shooting murres is permitted throughout the year.

Illegal hunting has been observed several times in Northwest Greenland and the restrictions in the northwestern districts seem to be difficult to respect by both professional hunters and leisure-time hunters. Interviews and meetings with hunters in Upernavik show that intensive hunting occurs from the beginning of May to mid-June. Most birds are shot near the breeding colonies in the most populated areas in the Upernavik District (Greenland Homerule Authority, The Department of Environment and Nature 1998). During summer field work in 1998, the Greenland Institute of Natural Resources observed illegal hunting near some of the breeding colonies in Upernavik (6 times on 11 days) (Merkel et al. 1999). From this observation of illegally-shot murres, Merkel et al. (1999) concluded that the illegal harvest alone might be a serious threat to the breeding colonies in southern Upernavik.

Table 7. Murre breeding populations in different regions of Greenland.

Area of the country and municipality	No. colonies	Population (No. Birds)	Change in population	Status
North Greenland				
Avanersuaq	5	285,000	>10% reduction ?	Stable
Northwest Greenland				
Upernavik, north	3	160,000	30% reduction	Unstable
Upernavik, south	5	14,000	80 - 90% reduction	Unstable
Uummannaq	0	0	Exterminated	-
Ilulissat	1	4,500	90 % reduction	Unstable
Southwest Greenland				
Maniitsoq	3	23,000	40 - 50% reduction	Stable
Nuuk	2	1,200	Reduction ?	Stable
Paamiut	1	2,300	50 - 60% reduction	Unstable
Qaqortoq	1	7,700	New colony	Stable?
East Greenland				
Ittoqqortoormiit	2	17,300	35 - 50% reduction	Unstable

Source: (Falk and Kampp 1997)

Based on patterns of band recoveries and on rates of population declines observed in murre colonies in West Greenland, the traditional summer hunt near the breeding areas has been identified as a major cause for the substantial breeding population decrease (Evans and Kampp 1991, Falk and Durinck 1992). This decline is described in Table 7.

Harvesting near the breeding areas has been identified as a major reason for the decrease. Other factors such as commercial hunting during the 1960s and early 1970s, bycatch in fishing nets in the period between 1965-75, and increased disturbance near the colonies by boat traffic and helicopter traffic may also be mentioned as reasons for the decrease.

The winter harvest in Southwest and South Greenland makes up more than 80% of the total annual murre harvest (Greenland Homerule Authority, Piniarneq 1993-1999); however, the spring hunt in Northwest Greenland takes the highest proportion of the Greenlandic breeding birds (Falk and Durinck 1992).

Data from Upernavik District, which has the largest number of available counts in Greenland, show a significant negative relationship between the average annual rate of decline and the distance from the colony to the nearest settlement (Evans and Kampp 1991). Therefore, the hunts in Northwest Greenland (and probably in East Greenland) pose a major threat to local breeding populations and probably have been the major cause for the extinction of the breeding population in Uummannaq Municipality (Table 7). The greatest future threat to the colonies will probably be hunting near the colonies during the breeding season.

Total annual harvest

The size of the annual murre harvest has been estimated several times over the past 100 years but never using the same methods. Early estimates by Müller (1906) suggest that about 100,000 murre were harvested annually. In 1967, Salomonsen estimated an annual harvest of 200,000 birds. According to Salomonsen (1967), two thirds of these birds were assumed to be hunted near the colony during the breeding period.

More recent estimates made by Falk and Durinck (1992) in the late 1980s indicate an annual harvest of 92,771 made by commercial hunters alone. This estimate is based on the number of birds available for purchase at markets and on information from processing companies and institutions such as schools, restaurants, hospitals, and homes for the elderly.

The noncommercial hunting was roughly estimated as 190,000-293,000 murre annually. This means that the total harvest estimates in the late 1980s ranged from 280,000-390,000 birds per year (Falk and Durinck 1990, 1992).

Hunting statistics have been compiled in Greenland since 1993. According to the statistics published for the years 1993-1996, the number of murre shot was 187,645 (in 1994) and 253,286 (in 1996) (Figure 3). The hunting statistics are a good indicator of the murre harvest and may be of great use for future management. The statistics, however, have also been suspect for seriously underestimating hunting pressure. Based on birds available for purchase at the outdoor market in Nuuk in 1993, Frich (1997a) found that only 43% of the murre available were reported in the hunting statistics. According to Frich (1997a), these data are not necessarily representative of all of Greenland.



Figure 3. Harvest of mures in Greenland, 1993-1996

Murre egging

The harvest of murre eggs is of great cultural significance in several districts in Greenland; and until 1988, harvesting of eggs was allowed in several municipalities. In 1988, a total ban was introduced in the whole country by the new executive order). Egg collecting is much less important now than in the past. In Upernavik, egging had, and maybe still has, a significant role. In the mid-1980s (before the new executive order), Evans reported that about 1,000 eggs were collected in Upernavik Municipality. However, the egg harvest in Upernavik probably has less importance now than in the past as is the case in other parts of the country. It is known that illegal egging takes place in the country (Greenland Home Rule Authority, The Department of Environment and Nature 1998), but no data exist on the extent of the illegal egg harvest.

2.4.4 Harvest of eiders in Greenland

The population and harvest of common eiders (*Somateria mollissima*) and king eiders (*Somateria spectabilis*) in Greenland are not as well described as for mures. It is clear that the two eider species always have been among the most exploited seabirds in Greenland.

Common eiders breed in scattered locations along the coasts of Greenland. Today the largest concentrations of breeding birds are found in Avanersuaq District where large colonies are located on several small islands (Christensen and Falk 1999). Due to the late or sometimes lacking ice breakup in East and Northeast Greenland, the common eider population there is very scattered (Salomonsen 1967). Boertmann et al. (1996) estimate the Northeast Greenland population to be a few thousand pairs. In the rest of West Greenland only a few large colonies are known (Boertmann and Mosbech 1997). Little information concerning the breeding population numbers in Greenland is available. Boertmann et al. (1996) estimate the current population size to be in the magnitude of 10,000-100,000 pairs, with the majority breeding in Avanersuaq. Recent studies, however, in Avanersuaq, Upernavik, and Disko Bay regions indicate that 10,000-20,000 is a better estimate of breeding pairs in Greenland (Merkel pers. comm.).

During the winter large numbers of eiders, including an unknown number of Canadian origin, stay in the ice free areas in West and Southwest Greenland. Almost all eiders breeding in West Greenland probably stay in the ice free areas in Southwest Greenland. Smaller numbers are found in leads and open water areas in North Greenland (Salomonsen 1967).

The number of king eiders breeding in North and Northeast Greenland is unknown, but is considered to be small (Salomonsen 1967). During late summer, large numbers of king eiders, mainly from breeding grounds in northeast Canada, arrive in central West Greenland. This post breeding population has been estimated at 30,000-40,000 molting birds each year for the years 1993-1995 (Mosbech and Boertmann, in press). Some hundred thousand king eiders also winter in the open water area in Southwest Greenland (Boertmann and Mosbech 1997).

At the beginning of the 19th century, the common eider was a very abundant breeder from north to south along the west coast. Müller (1906) and Salomonsen (1967) ascribed the reasons for the drastic decline in the common eider population to human exploitation. During the 19th century, the common eider was one of the most important resources: down collection, egg collection, and taking of birds was very intense. Müller (1906) characterized the Greenlandic exploitation of that era as a "disgraceful maltreatment." Vibe (1967), however, has argued that a strong climatic/oceanographic change might have influenced the common eider population as well.

Regulations

The strong decline in the common eider population resulted in stricter regulations regarding the collection of eider eggs and down in the late 1950s. According to these regulations, it was forbidden to collect eggs; down collecting was only allowed after 20 July. Some restrictions for shooting birds during the breeding period were also introduced. There were many exemptions to these restrictions around the country, and the restrictions were not sufficiently implemented in all municipalities (Salomonsen 1967). In 1988 and 1989, a ban on collecting eider eggs and down was introduced (except for the municipalities of Avanersuaq and Ittoqqortoormiit) by executive order. Also, a closed season for shooting eiders during the summer was introduced. According to Boertmann et al. (1996), this closed season is generally not observed and eiders are still shot illegally during the breeding season.

In contrast to the harvest of murre, there is no lawful discrimination between professional hunters and leisure-time hunters of eiders. Both types of hunters are allowed to sell eiders, primarily at the local outdoor markets, to processing companies, and institutions (Frich 1997e).

Collection of down and eggs

King eiders are solitary breeders and only nest in the northernmost and eastern parts of the country. Therefore, the following comments concerning down and egg collection apply only to the common eider. Down collection became a very important economic foundation for many people in Greenland during the 19th century. The down collection was intense during a 50-year period (Figure 4), especially in South Greenland, where the breeding population of common eiders probably has been as big as in Northwest Greenland. The numbers in Figure 4 correspond to down collection from about 110,000 nests in 1822 and only about 10,000 in 1896 (Müller 1906, Salomonsen 1967). Müller (1906) described that when a nest was visited both eggs and down were collected. Therefore, the curve in Figure 4 might be relatively correlated with the amount of harvested eggs. No estimates concerning the numbers of collected eggs in the early



Figure 4. Decrease in pounds of eider down collected in Greenland during the 19th century. The decrease is described in the literature as a result of heavy human exploitation (shooting birds, collecting eggs and down) (Müller 1906).

19th century are available, but Salomonsen (1967) estimated that the harvest in the beginning of the 20th century was around 60,000 eggs per year.

The harvest of eider nests was traditionally widespread in the colonies in mid-West and Southwest Greenland. Due to the current reduced size of these colonies it is now probably performed only on an opportunistic (and illegal) basis (Boertmann et al. 1996). According to the 1989 executive order, eider eggs and down can be collected until 25 June in Avanersuaq and Ittoqqortoormiit Municipalities.

In the large common eider populations in Avanersuaq, down and eggs are still collected, especially during late June (Boertmann et al. 1996). No exact data exist on the level of down and egg harvests that occur in Avanersuaq, but Born (1987) estimated that 2,000-4,000 eggs were collected in a colony at Inglefield Land. Thing (1976) estimated that 3,500-4,000 eggs were collected at the same locations some years earlier. There are no data available on the egg and down harvest in Ittoqqortoormiit, but according to Frich (1997e) a limited collection may take place.

Total annual harvest by shooting

Salomonsen (1967) estimated an annual harvest of about 150,000 common eiders at the turn of the 19th century. In the 1950s, the Ministry of Greenland estimated the annual harvest of common eiders at 144,000 birds from 1948-51 (Salomonsen 1967). Based on band recoveries, Salomonsen (1967) estimated that the annual number of birds killed was approximately 480,000

during the 1960's. Compared to the other estimates and to the size of the human population at that time, this estimate may be high.

Hunting statistics from 1993-1996 provide the most recent data for the eider harvest in Greenland (Figure 5). The numbers seem small compared with earlier estimates, but in light of counts of eiders available for purchase at the outdoor market in Nuuk during different periods, Frich and Falk (1997) found that the number of birds available corresponded to the numbers in the reported harvest record shown in Figure 5. Frich and Falk (1997), however, concluded that the distribution of harvested common and king eiders did not correspond with reality. It was found that king eiders may represent about 32% of the eiders available at the outdoor market in Nuuk (Frich and Falk 1997).

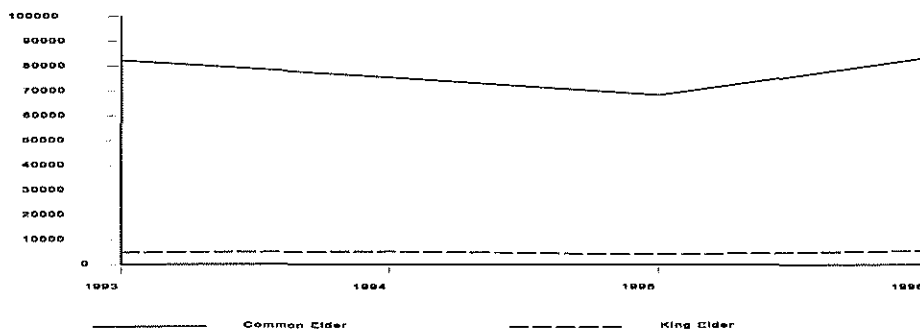


Figure 5. Harvest of eiders in Greenland, 1993-1996

A considerable portion of the molting and wintering king eiders that stay around the Disko Bay region and South Greenland from August to May are of Canadian origin; the share of Canadian king eiders in the harvest is uncertain (Frich 1997e). Frich (1997e) assessed that the harvest during the late winter and spring in West Greenland may be the biggest threat to the eider populations for two reasons: (1) because most birds are shot during this period, and (2) because the harvest of breeding birds is most intensive here.

2.4.5 Harvest of other seabirds in Greenland

Even though murres and eiders are the most commonly harvested species in Greenland, harvests of other species may reach the same level in some districts. For most other species, the information concerning the harvest is limited.

Black guillemot

The black guillemot is the most widespread auk in Greenland and is a popular game bird in some districts (Boertmann et al. 1996). According to Salomonsen (1967), juveniles in particular are a popular meat supply during autumn and winter. Müller (1906) mentioned that black guillemots were hunted in municipalities where hunting from the iceborder was possible. Presently, this does not seem to be true. According to the reported annual harvest record from 1996, most birds were shot in the northern municipalities of Southwest Greenland (Nuuk 5,264 and Manitoq 3,192) and East Greenland (Ammassalik 4,684). In the northwestern districts, black guillemots are taken only accidentally (Uummannaq 888, Upernavik 997, and Qaanaq 44). The compiled hunting statistics for black guillemots from 1993-1996 are shown in Figure 6. Even though no analysis has been done as to whether the number of birds shot corresponds to the numbers in the reported harvest record, it seems probable that the mortality might be higher.

Dovekie

In Greenland, very large populations of dovekie are found in Avanersuaq in Northwest Greenland and the mouth of Ittoqqortoormiit in East Greenland. The population size in these two districts has been estimated to be several million birds (Boertmann et al. 1996). Because of the very scarce human population in these municipalities and because there is a long tradition for harvest of dovekies in these districts, there is no closed season here. In the two districts, dovekies are caught with nets in the breeding colonies. Although, at least in Avanersuaq, dovekies are heavily exploited during the breeding season, Salomonsen (1967) concluded, based on patterns from band recoveries, that the harvest had no effect on the total population. Later estimates made by Dietz and Heide-Jorgensen (1984) indicate that the annual harvest was about 250,000-500,000, which is probably higher than what would have been expected by Salomonsen. The compiled hunting statistics for dovekies from 1993-1996 are shown in Figure 6. In 1996, 64,486 dovekies were reported harvested and nearly all were reported from Avanersuaq (59,681). This was also the case in earlier years (Boertmann et al. 1996).

A limited commercial production takes place primarily in Avanersuaq. The numbers vary from year to year as shown in Table 8. According to the compiled hunting statistics, dovekies are only harvested in small numbers in West Greenland during the winter.

Iceland gull, glaucous gull, and great black-backed gull

These species are traditionally harvested in Greenland. According to Salomonsen (1967), the great black-backed gull and the Iceland gull were harvested at a significant level. Based on band recoveries, he suggested that about 25% of each of these two species were shot annually. Salomonsen (1967) found that the band recoveries for glaucous gulls was 12%. Almost all *Larus* gulls shot were juveniles. All three species are still shot on an opportunistic basis (Boertmann et al. 1996). Egg collection from these three species is allowed until 1 July. Eggs must only be collected for personal consumption. It is known that eggs are collected on an opportunistic basis, but no data describes the level of this harvest.

Black-legged kittiwake

Black-legged kittiwakes are a popular game bird especially in mid-West and Southwest Greenland. According to Salomonsen (1967), the harvest in the 1960's was most intense in the spring (May and June). According to the existing regulations in Greenland, a harvest is not allowed after 1 June. No data describes whether the harvest has had an effect on the population, but according to Boertmann et al. (1996), the black-legged kittiwake population in Greenland

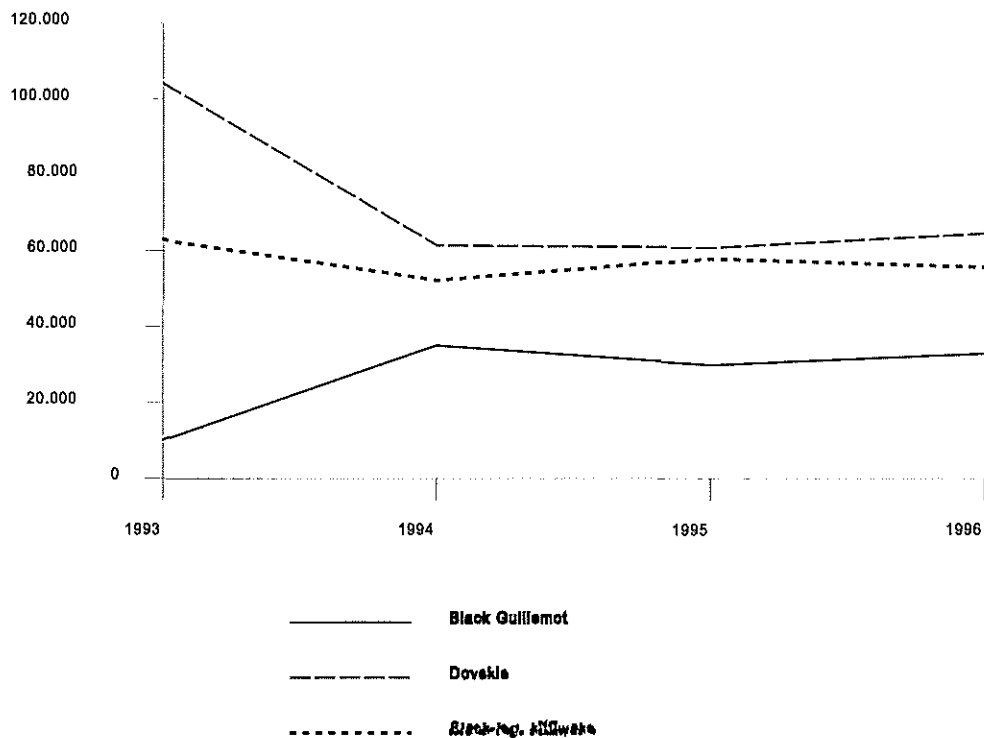


Figure 6. Harvest of black guillemots, dovekies, and black-legged kittiwakes in Greenland according to the reported bag record. The curves are the result of the numbers of birds reported shot (Greenland Home Rule Authority, Piniareq 1993-1999).

decreased until the middle of the 20th century. A local increase has been recorded during recent decades, however. The actual numbers shot in 1993-1996, according to the harvest record system, are shown in Figure 6. Boertmann et al. (1996) estimate that the actual numbers shot are probably about 100,000-200,000. An explanation for why the Greenlandic black-legged kittiwake colonies have not decreased more drastically during these years could be that the origin of some of the birds shot in Greenland might be from other North Atlantic populations (Nielsen 1999).

Egg collection is allowed until 1 July. Although eggs must only be for personal use, many eggs and chicks are collected (Boertmann et al. 1996). No data exists for the number of eggs harvested.

Arctic tern

The harvest of Arctic terns is not allowed and the law appears to be respected (Frich 1997d). Harvest of terns was once legal, but has always been limited according to Salomonsen (1967).

By executive order, eggging for personal consumption is permitted until 1 July. In Greenland and especially in the municipalities around the Disko Bay Region, egg harvest has been very widespread. Early estimates made by Salomonsen suggest that 100,000 eggs were collected annually before 1961 on Gønne Ejland in Disko Bay, perhaps the greatest tern colony in the world at that time. Since 1961, egg collecting has not been allowed after 1 July. The restrictions have never been respected, however, and by the middle of the 1960s the population in the Disko Bay region had suffered a major decline (Salomonsen 1967). Based on personal observations at the islands in 1996, Frich (1997d) estimated that the annual amount of legally collected eggs was in the range of 3,000-6,000 eggs and further suggested that some illegal egg collecting might still

occur. Frich (1997d) concluded that the tern population has suffered from egg collection to such an extent that it is only possible to harvest 10,000 eggs per year these days (including the illegal take of eggs).

Northern fulmar

The northern fulmar is regarded as unpalatable by most Greenlandic people; however, it is still hunted locally in Greenland. Hunting takes place in the regions with large colonies, primarily Qeqertarsuaq and Uummannaq Municipalities, where it is possible to shoot newly fledged juveniles. Based on band recovery patterns, Salomonsen (1967) estimated that about 4% of the total breeding population was shot annually.

Great cormorant

The great cormorant was, according to Salomonsen (1967), the subject of intense harvest along the west coast. Salomonsen (1967) estimated from band recoveries that about 30% of the population was shot. Hunting pressure appears to have decreased in recent decades and Boertmann et al. (1996) consider that the reduced hunting pressure could explain the current population increase in Greenland.

The harvest of other seabirds not described in this report may happen although they are protected throughout the year. This harvest seems to be opportunistic.

2.4.6 Economy and public information programs

Seabird eggs collected in accordance with the executive order concerning the protection of birds must not be sold commercially. Seabirds are subject to various kinds of trade in Greenland and there is no doubt that seabirds make a significant contribution to the income of some hunters in Greenland. Hunters are allowed to sell game of the season at the local outdoor market called *brættet* (the board). It is a general rule that only hunters with a professional hunting license are allowed to sell game of the year at the local outdoor market; however, in some municipalities leisure-time hunters are allowed to sell at the local outdoor market. The number of birds sold is not known, but according to Falk and Durinck (1992) there is only a market for selling birds in the "large" towns, where there are many potential customers not shooting their own birds. The most popular game birds sold at the local outdoor markets are murre, eiders, and kittiwakes (A. Frich pers. comm.).

Falk and Durinck (1992) estimated that about 70,000 murre were sold annually at the local outdoor markets between Aasiaat and Nanortalik. The price for a murre sold at the local outdoor market was around 30 kr. (Danish crowns) (ca. \$4 US). The annual trade was approximately 2,100,000 kr. (ca. \$300,000 US). Based on new calculations Frich (1997c) estimated that 58,000 murre were sold during the winter of 1995-1996 at the two local outdoor markets in Nuuk alone. This gives an annual "murre-trade" of about 1,740,000 kr. (ca. \$250,000 US) at these two markets.

Seabird species are the object of commercial production; a number of processing companies around Greenland process and distribute seabirds provided by hunters (Table 8). Furthermore, it must be mentioned that restaurants, hospitals, and homes for the elderly buy birds directly from hunters.

Table 8. *Quantity of commercially produced seabirds in Greenland and prices paid to hunters by commercial processing companies, 1995-1997*

	In 1000 kr. ^a			Number of Birds		
	1995	1996	1997	1995	1996	1997
Black guillemot	-	3	2	-	381	283
Murres	115	315	259	7,776	30,387	19,722
Eiders	2	19	49	211	1,695	4,417
Dovekie	85	6	25	27,780	2,116	8,247
Total	203	346	336	35,772	34,810	32815

Source: (Greenland Home Rule Authority 1999).

^a(1 Danish Crown (kr.) = \$6.83 US, on March 22, 1999). Notice that the figures do not refer to birds sold by hunters at the different outdoor markets or birds sold directly to institutions.

Information programs, public outreach programs, and programs to reduce illegal hunting have been implemented. In general, the outreach programs conducted by scientists and people in the administration have been marked by limited time and resources, and by large distances between the administration and scientists versus the hunters. Probably the most thorough program has been was a World Wildlife Fund (WWF) campaign conducted during the late 1980s. The program was directed towards hunters in southern Upernavik where illegal and widespread hunting was thought to be a factor contributing to population declines of thick-billed murres in the area. Communication and consultations between scientists and hunters were an essential part of the program. A poster and a movie describing the problems were created. Even though the project seemed to be a success initially, hunting behavior did not change and the thick-billed murre population did not increase. This may have been because the dialogue between the hunters and administration was not continued during the following years.

In 1998, the responsible department in the Home Rule Authority and the Institute of Natural Resources began a more long-term project, again focused on the large harvest of murres in southern Upernavik. The municipality was visited by scientists and people from the administration. Consultations in Upernavik town and the nearby settlements were again given a high priority. The program is planned to be continued in 1999 and the responsible public institutions will make this information program a priority during the next years. The goal of the project is to obtain mutual respect and two-way communication between resource managers and users.

2.4.7 Management recommendations

Greenland's management priorities related to seabird harvests include the following:

- Gather information from hunters concerning their knowledge of the relationship between human needs and use of seabirds, especially of murres and eiders.
- Build mutual respect and two-way communication between resource managers and hunters by creating programs like the one started in Upernavik.

- Use local knowledge to a greater extent in both scientific and administrative work.
- Create a new executive order concerning bird protection that would be more inclusive and would protect *areas* of importance for breeding, molting, and over-wintering birds. Hunting bans could be enforced within important areas.

2.5 REVIEW OF THE HUNTING AND HARVEST REGIMES FOR SEABIRDS IN ICELAND

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Iceland**

2.5.1 Locations where seabirds are harvested

Harvests of seabirds occur in every part of Iceland at hundreds of colonies, especially along the coast or on islands, but also inland where northern fulmars, Arctic terns, black-headed gulls, great black-backed gulls, and lesser black-backed gulls nest. There is a long history of harvesting seabirds in Iceland, especially at colonies, dating back to the settlement of Iceland 1100 years ago.

The most intense hunting at sea originates from nearby towns and villages especially in the north, east, northwestern fjords, and in the Faxaflói region in the west-southwest.

2.5.2 Species and parts harvested

General reviews of seabird harvests in Iceland were published in 1982 and 1996 (Petersen 1982, 1996). Today, the species most harvested are eiders, Atlantic puffins, common and thick-billed murres, razorbills, black-legged kittiwakes, Arctic terns, northern fulmars, greater and lesser black-backed gulls, black-headed gulls, herring gulls, and glaucous gulls. Great cormorants, shags, black guillemots, and gannets are harvested to a lesser degree. Eiders are economically the most important seabird species, mainly for their down and sometimes their eggs. Eggs of the gulls and terns are harvested.

2.5.3 Numbers of birds, eggs, and down harvested

Hunting statistics have been compiled in Iceland since 1995 as a result of new legislation. Hunters need to register with the Wildlife Management Unit for a hunting license and pay a small fee (ca. \$25 US). Reissuing of a hunting license depends on whether an annual report has been submitted by the hunter. The license fees form a fund used to compile hunting statistics and to research species which are hunted (either for their economic value or as pests). Hunting statistics for 1995-1997 are shown in Table 9. No information is available on the number of eggs collected.

Atlantic puffins are harvested in the largest numbers (185,000-233,000) per year. These are mostly adult birds harvested at colonies using pole nets, but some are shot at sea. Between 86,000-113,000 common and thick-billed murres and razorbills are killed annually. They are primarily shot at sea, but small numbers are also caught at colonies using pole nets. The number shot may vary according to how many birds are caught and marketed as fisheries bycatch. The bycatch figures (estimates only) of the three large alcids should be added to the number of birds shot to get the full impact of murres killed in Iceland. Other seabird species are taken for food in much smaller numbers. Attention should be drawn to the large numbers in Table 9 for gulls, especially lesser black-backed and great black-backed gulls, which are killed as pests.

Table 9. Seabird hunting statistics for Iceland 1995-1997.

Species Name	1995	1996	1997
Great black-backed gull ^a	35,762	32,748	29,076
Lesser black-backed gull ^a	22,340	22,380	26,808
Herring gull ^a	5,998	4,798	4,690
Glaucous gull ^a	3,942	4,546	3,620
Black-headed gull ^a	2,958	2,696	2,443
Black-legged kittiwake	1,371	1,461	2,324
Northern fulmar	8,059	8,920	10,093
Gannet ^b	707	994	636
Great cormorant	2,550	2,975	2,678
Shag	5,128	6,499	4,396
Razorbill	18,461	27,573	20,510
Common murre	52,867	65,019	58,132
Thick-billed murre	15,114	20,479	14,943
Black guillemot	3,424	4,077	3,868
Atlantic puffin	215,517	232,936	184,664
Parasitic jaeger ^a	2,617	2,292	1,907

^aPrimarily shot as pest species

^bYoung only

About 3 tons of eider down is collected per year from nests. The harvest of seabird eggs is less clear because of lack of information.

2.5.4 Cultural and economic significance of seabird harvests

Harvesting seabirds now is primarily considered as a hobby or supplemental income. The main exception is eider down collecting, firmly based in the agricultural industry; but even this activity is becoming more of an income supplement for hobbyists. Many bird hunters (including puffin hunters) and egg collectors (primarily razorbill, common murre, black-legged kittiwake, and northern fulmar) set aside a part of their summer holidays for harvesting. Traditional catching or collecting methods are used (there may be some slight local variations), but technological changes are also being added: *e.g.*, the use of 4-wheel drive vehicles or tractors and the use of two-way radios when descending cliffs.

Eider down collecting is about a \$2 million (US) industry annually, divided (unequally) between some 250-300 landowners. There are considerable price fluctuations on the foreign markets.

There are domestic sales of adult puffins and auks (netted, shot, bycatch) and their eggs; black-legged kittiwake and other gull eggs; northern fulmar eggs (to a lesser extent); and gannet, shag, and great cormorant young. These sales occur almost exclusively within the country, but some export of Atlantic puffins to the Faeroe Islands takes place. Much (but an unknown proportion) of the catch never reaches the market but is consumed locally, given away, or sold privately. An upsurge in the demand for seabirds as food has been seen in Iceland during the past 10-15 years

by Icelanders and by the increasing number of tourists. Seabirds are marketed as a delicacy or specialty item.

2.5.5 Public outreach programs aimed at seabird harvesting

There are currently no public outreach programs aimed at seabird hunting or harvesting.

2.5.6 Who is harvesting seabirds and why

Landowners (state, other local authorities, or individuals) have the right to allow or ban hunting on their land. Landowners have hunting rights to 115m seaward. Beyond that boundary are commons. The right to harvest seabirds is leased in some areas; e.g., in the Westman Islands where puffin harvesting is leased to clubs (one in each puffin-catching area). Some specific seabird cliffs are also leased to groups. Egg-collecting is a popular source of income for local rescue clubs.

2.5.7 How harvesting is regulated

The Ministry for the Environment supervises the Act on Conservation, Protection, and Hunting of Wild Birds and Land Mammals (No. 64/1994). Harvesting, conservation, and protection of birds (including seabirds) is governed by this act since 1 July, 1994. This superseded the old bird protection act of 1966, the act on fox and mink hunting (1958), and some other minor articles. There is no agency that specifically regulates hunting, but a committee advises the Ministry for the Environment on all matters concerning hunting, protection, etc. There are specific seasons for hunting or harvesting individual species. The Icelandic Institute of Natural History conducts research on the effects of hunting and provides advice on matters related to hunting, such as hunting pressures. No programs specifically related to seabirds are currently underway.

The maximum range of hunting seasons is outlined in the Wild Bird and Mammal Act for those species for which hunting is allowed. The actual hunting seasons can be shortened (but not lengthened) with a special regulation. The regulation currently in force is No. 456/1994, with amendment No. 506/1998.

Generally, only guns (up to 12 gauge) and rifles can be used for hunting. Adult seabirds may be hunted between 1 September and 31 March (except alcids which can be hunted until 10 May). Puffins, razorbills, and common and thick-billed murres can be taken at colonies with a triangular pole net between 1 July and 15 August.

Eggs and young of the following seabird species can also be taken: gannets; great cormorants; shags; northern fulmars; great skuas; greater and lesser black-backed, black-headed, herring, and glaucous gulls; black-legged kittiwakes; Atlantic puffins; common and thick-billed murres; razorbills; black guillemots; and Arctic terns. The periods for egg collecting or catching of young are not specified, except for Arctic terns, herring gulls, glaucous gulls, and black-headed gulls, the eggs of which must not be taken after 15 June. Three gull species (classified as pests) can be killed year-round.

No specific wildlife enforcement service is found in Iceland. The general police uphold the law on wild birds.

Harvest levels occurring now are not thought to greatly affect any of the species at the national level. There are indications as to effects (at least temporal) of harvests at individual colonies, but these are not well documented and further research is needed.

2.5.8 Recommendations to improve the management of seabird harvests

Iceland recommends the items below to improve the management of seabird harvests in Iceland.

- Research programs concerning population sizes and the effects of harvesting, both local and national, should be undertaken. Emphasis should be given to the black-backed gull, cormorant, and the alcids (especially Atlantic puffins, common murre, and razorbills).
- More information is needed on egg collecting, especially of black-legged kittiwake, razorbill, and common murre eggs.

2.6 HARVESTING OF SEABIRDS IN NORTH NORWAY AND SVALBARD

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2.6.1 Introduction

Harvesting of marine birds has a long tradition in north Norway and used to be widespread and important. Today, the extent of harvesting is reduced and subject to strict regulations.

Egging, down collecting, and harvesting of adult birds and chicks were important commercially and for food supply in the past for the rural residents of coastal northern Norway (Wold 1981). To harvest Atlantic puffin chicks on the Røst Islands and Værøy (Nordland County), people used dogs trained to catch the chicks in the colony. The dogs were bred to a special race named "puffin dog" (Lundehund) and exhibited special skills for the purpose of catching fledglings. Other techniques (primarily ground and aerial nets as well as landing nets, hooks, noose poles, and firearms) were also commonly used to harvest adult puffins, common murres, razorbills, and nestling shags in and near the breeding colonies. Egging of common eiders, auks, kittiwakes, gulls, and terns was also important to the coastal people, as was the collection of eider down. In Nordland County, the people made artificial nest boxes for eiders, protected the breeding birds from predators, and harvested eggs and down from the nests. Around 1900, about 1 metric ton of cleaned eider down was sold in Nordland County. Farther north, in the counties of Troms and Finnmark, about 250 kg and 200 kg was sold, respectively (Wold 1981).

In Svalbard, common eiders have been harvested since the 16th century, but reliable harvest data exists only from the middle of the 18th century onwards (Norderhaug 1982). Both eggs and down were heavily collected and the population was greatly reduced before it was protected by law in 1963. Hunters also used to visit seabird colonies where they collected eggs and adult birds (Rossnes 1981). At Bjørnøya, 50,000-60,000 eggs were collected annually between 1952-1958, mainly from common and thick-billed murres. This activity was stopped in 1971 (Rossnes 1981).

2.6.2 Present regulations

The hunting regulations in north Norway and the Svalbard region are shown in Tables 10 and 11, respectively. Species not mentioned in the tables are protected throughout the year.

In Norway, land proprietors are allowed to collect eggs from herring gulls, great black-backed gulls, common gulls, and black-legged kittiwakes until 4 June. Collection of eggs from common eiders is only permitted before 1 June in areas where the tradition of housing eiders is maintained. In Svalbard, egging in general is prohibited, but the Governor of Svalbard may issue special permits to allow egg collecting.

Collection of common eider down is allowed on the Norwegian coast (in summer) after the chicks have left the nest. In Svalbard, collection of down is allowed outside the protection areas from 16 August to 31 October.

Table 10. *Hunting regulations for marine birds in north Norway, excluding Svalbard.*

Species	Hunting period
Great cormorant and shag	1 October - 30 November
Greylag goose	21 August - 30 October
Oldsquaw and red-breasted merganser	10 September - 23 December
Black-headed gull	21 August - 28 February
Common gull, herring gull, great black-backed gull, and black-legged kittiwake	10 September - 28 February

Table 11. *Hunting regulations for marine birds in Svalbard.*

Species	Hunting period
Northern fulmar	21 September - 31 October
Thick-billed murre	1 September - 31 October
Black guillemot	1 September - 31 October
Glaucous gull	11 August - 31 April

2.6.3 Effects of seabird harvesting

Harvesting, in general, is not a significant threat to marine birds in northern Norway because of the relatively strict regulations. Approximately 3,000 cormorants are shot annually (estimate based on hunting statistics and band recoveries). Increased hunting pressure on greylag geese in Nordland and Finmark Counties may have lead to changes in the timing of autumn migration. Barnacle geese are hunted in winter in Scotland, but this probably has no significant negative effect on the population. Harvesting of common eiders is recognized as a serious threat to the population in the Russian areas.

Along the Norwegian coast, eggs of great black-backed and herring gulls are heavily harvested early in the egg-laying period, but the birds are usually left undisturbed to incubate later in the season. Eggging and hunting of common murrens almost certainly contributed to the decline of the population on the Norwegian coast. Poaching still occurs in some colonies and may be a serious threat to the potential recovery of the local populations.

Many thick-billed murrens breeding in Norway and Svalbard migrate to waters off western Greenland and Canada in winter. Therefore, an intensive harvest in these areas also affects the Barents Sea population, but it is uncertain if that harvest is a threat to the Norwegian population. Also, dovekeys are hunted in waters off Greenland. Although they breed in the Barents Sea and migrate to this area, hunting is not recognized as a serious threat to the population.

2.6.4 Management recommendations

The recommendations given here for Norway/Svalbard are valid only for seabirds occurring north of the Arctic Circle. The present harvest levels are not thought to greatly affect any seabird species at the national level. To ensure that the harvest remains sustainable, however, it will be important to implement the following.

- Develop long-term monitoring programs for game birds to evaluate the population effects of those harvests.
- Harmonize and coordinate seabird monitoring in the Russian and Norwegian areas.
- Initiate and continue special studies for cormorant, greylag geese, and thick-billed murre to improve harvest information on these populations.

2.7 SEABIRD HARVEST IN RUSSIA

by Alexander Golovkin

**Ministry of Environment and Nature
Resource Protection
Russia**

2.7.1 Introduction

In northeast Russia, the Chukotka and Kamchatka indigenous people have harvested seabirds since ancient time. There is some archeological evidence of the harvest based on the remains of seabirds and special hunting instruments for birds. Seabirds and their eggs are harvested by local indigenous people today, but to lesser degree.

Seabird harvests in Russia by non-Native people have been occurring for more than two centuries. The harvests coincided with the colonization of northwest and northeast Russia.

2.7.2 Harvests by region

Barents Sea region

One of the first records on the harvest of murre in the Barents Sea region was published at the beginning of the 19th century (Lepekhin 1814). Special teams of collectors caught murre on the colonies of Novaya Zemlya, salted them, and used them for food or transported them to Arkhangelsk to sell. Local people used the meat, feathers, and skins of the birds. Fishermen may have collected birds and their eggs even earlier during the era of expeditions along the Murman and Barents Sea coasts.

From the middle of the 19th century to the beginning of the 20th century, tens of thousands of birds and their eggs were collected annually (Sidorov 1873, Ukhtomski 1881). Some of the birds were used to feed sled dogs and some eggs were used for food.

During the 1920s and early 1930s, the number of murre and their eggs collected increased dramatically. At Besymyannaya Bay (the largest seabird colony on Novaya Zemlya) 342,500 murre eggs were collected and more than 12,000 adult birds were killed in 1933 (Krasovski 1937). Trade workers used big baskets to collect eggs on the flat cliff shelves and used spiked poles to kill murre.

The number of seabirds and their eggs harvested from the mid-1930s thru the 1950s continued to increase (3,000,000 murre eggs and 500,000 adult birds). During that time, it became clear that urgent conservation measures were needed to prevent a total destruction of the murre colonies. Rational methods of exploitation of the colonies were proposed (Krasovski 1937, Kaftanovski 1951, Uspenski 1956, Belopolski 1957). Recommendations included: (1) harvest only part of the colony, (2) harvest from the colony only once in two years, (3) collect only the first clutch, and (4) collect no more than 20% of the eggs laid in the season.

During the same period, the Seven Islands Branch of Kandalakshski State Reserve was established in 1938 on the Murman coast and the Novozemelski Branch was established in 1947

in the Novaya Zemlya Archipelago. Inside the territory of the reserves, egg collecting and harvesting of birds was prohibited. In 1970, the territory of the Seven Island Branch was extended, but the Novozemelski Branch was closed.

New hunting regulations prohibit harvesting of eggs of all bird species everywhere in Russia. Shooting of birds at sea is also prohibited in the Murmansk region. Nevertheless, seabird eggs (mostly murre and herring gull) are still collected illegally today Barents Sea region. The total illegal harvest is considered to be some thousands of eggs annually.

Commander Islands

When Russian expeditions landed on the Commander Islands in the 18th century, they began using the islands' seabird resources intensively. For example, Pallas's cormorant (*Phalacrocorax perspicillatus*) was abundant on the Commander Islands before 1741 when Commander Vitus Bering was shipwrecked on what would named Bering Island. The crew of Bering's ship used this species as a main food item because it was much bigger and tastier than other birds. This exploitation, combined with an epidemic bird disease, probably contributed to the extinction of Pallas's cormorant (Iohanzen 1934).

In the 19th century, the Commander Islands were settled by Russians and Aleuts who also harvested seabirds and collected eggs. Their preferred species were northern fulmars, pelagic cormorants (*Phalacrocorax pelagicus*), thick-billed murres, horned and tufted puffins, and glaucous-winged gulls. The total number of birds and their eggs harvested annually was estimated as tens of thousands (Iohanzen 1934). Sometimes all the eggs in the colonies of Ari Rock near Bering Island and Sivuchi Rock near Medni Island were collected during the breeding season (Marakov 1966).

Currently, Aleuts on Toporkov Island (in the Commander Islands) collect 2,500-3,000 eggs annually (Zelenskaya 1999). This is considered to be a traditional use for the Aleuts in the area.

In 1993, Komandorski Nature Reserve was established in the Komandorski Archipelago. One of the special purposes of the reserve was to protect seabird colonies from exploitation. Today, some illegal seabird egg collecting still occurs due to a lack of law enforcement protection.

Kamchatka Peninsula

Historically, local people collected the eggs of common gulls (*Larus canus*) and black-headed gulls in large colonies near Petropavlovsk and Ust'-Bol'sheretsk. The total number of eggs collected annually was about 4,000-5,000 (Gerasimov, pers. comm.). Today, seabirds in this area are not harvested or are harvested in a negligible amount.

2.7.3 Present regulations

Alcids (and specifically thick-billed and common murres) are mentioned in the Federal list of conventional game species. This means they can be hunted in regions where local hunting regulations allow it. Hunting of four species of eiders is prohibited along the entire coast of Russia.

In the Barents Sea region seabird hunting is prohibited at sea in all seasons due to local regulations. In other regions of Russia murre hunting is allowed during autumn and winter.

The collection of eggs of any seabird species is prohibited throughout Russia. The penalty for egg collecting (or destruction of nests) is twice that for illegally killing adult birds.

2.7.4 Management recommendations

Russian recommendations to improve the management of seabird harvests are as follows.

- Improve regional nature conservation activities to implement seabird management plans, conservation laws, and hunting regulations.
- Cooperate and coordinate with non-governmental organizations to improve information outreach programs for conserving seabird populations in Russia.

3. RECOMMENDATIONS FOR MANAGEMENT AND RESEARCH

3.1 NATIONAL RECOMMENDATIONS

Seabird conservation will be advanced by a better understanding of seabird harvest regimes in the circumpolar nations. Countries in the circumpolar region have proposed several actions to improve their response to the issue of seabird harvests. Below is a summary of actions based on the country reports.

Alaska (USA)

There is a mandate in Alaska to provide a meaningful role for subsistence users in developing and implementing regulations regarding spring subsistence hunting as a result of new Protocol Amendments to the Migratory Bird Convention of 1916. The 1999 Protocol Amendments require the establishment of management bodies in Alaska to develop: seasons and bag limits, law enforcement policies, population and harvest monitoring, education programs, research and use of traditional knowledge, and habitat protection programs. Alaska proposes several broad recommendations: (1) determine potential impacts on Alaskan seabird populations caused by subsistence harvests, (2) maintain the opportunity to legally harvest seabirds at a sustainable level, and (3) accomplish the goals which will be established by the management bodies. Several specific recommendations are listed below.

- Monitor seabird populations, productivity, diets, and survivorship at selected colonies (especially in the Bering Sea region) to determine population trends.
- Maintain and update the Beringian Seabird Colony Catalog database; conduct new censuses to improve population estimates.
- Continue cooperative efforts with Native organizations and the Alaska Department of Fish and Game to collect and analyze data on subsistence harvests of seabirds in Alaska.
- Develop a license or permit system for the spring seabird harvest that would improve the information on the number of hunters and their harvests.
- Improve harvest surveys to collect more reliable species information.
- Determine the economic value of consumptive and non-consumptive uses of seabirds in Alaska.
- Document the role of seabird products in subsistence cultures in Alaska.
- Work with rural Alaskans to collect traditional knowledge regarding seabirds and their harvests.
- Conduct studies on the effects of human disturbance at seabird colonies to determine how to reduce those effects during the harvest period.
- Reduce disturbance at seabird colonies during the breeding season by restricting the distance from the colony that shooting can take place.
- Reduce local subsistence harvest of seabird populations that are declining significantly at specific seabird colonies.
- Develop or improve outreach and education programs (1) to disseminate seabird harvest information to rural communities, and (2) to reduce unnecessary disturbance at seabird colonies, which are harvested.
- Continue participation in international forums and agreements that provide opportunities for cooperative and coordinated management, research, and conservation of shared populations of seabirds.

Canada

- Improve knowledge of the level of seabird harvests and the species concerned, focusing initially on regions where the harvest is thought to be substantial and little information currently exists. A priority is to gather this information for razorbills and Atlantic puffins hunted in Newfoundland and Labrador, and for all seabird harvests in the Arctic.
- Regularly monitor the annual harvest of murres in Newfoundland and Labrador.
- Require a permit to hunt murres in Newfoundland and Labrador so that more accurate harvest estimates can be made.
- Review periodically the sustainability of the Newfoundland and Labrador murre hunt and make adjustments to hunting restrictions as appropriate.
- Closely monitor populations of heavily harvested species such as thick-billed murres and common eiders at breeding colonies and in over-wintering areas.
- Mount information, education, and enforcement programs to reduce or eliminate hunting. Use as models either the Québec-Labrador Foundation program in Québec North Shore (Blanchard 1984) or the Canadian Wildlife Service Newfoundland program (Elliot 1991) as appropriate. The razorbill harvest in Newfoundland and Labrador and the illegal sale of murres and eiders are priorities.

Finland

Finland seabird harvests have been on a sustainable level and adequately regulated to keep populations stable or allow them to grow. This situation may be changing, however, due to the increasing eutrophication in the Baltic Sea.

- Investigate the factors causing variation in recruitment rates of game species in the marine environment.
- Conduct hunting studies.

Greenland

- Collect information from hunters concerning their knowledge about the relationship between human needs and use of seabirds, especially of murres and eiders.
- Build mutual respect and two-way communication between resource managers and hunters.
- Use local knowledge to a greater extent in both scientific and administrative work.
- Create a new law concerning bird protection that would protect areas of importance for breeding, molting, and over-wintering birds. Impose a hunting ban within important areas.

Iceland

Harvests in Iceland are not thought to be greatly affecting any seabird species at the national level. There are indications, however, of effects (at least temporal) at individual colonies. To ensure that harvests are sustainable, Iceland is recommending the following.

- Conduct research on population sizes and the effects of harvesting, both local and national.
- Develop specific programs to assemble information on egg collecting, especially relating to black-legged kittiwakes, razorbills, and common murres.

Norway/Svalbard

The recommendations given here for Norway/Svalbard are valid only for seabirds occurring north of the Arctic Circle. The present harvest levels are not thought to greatly affect any seabird

species at the national level. To ensure that the harvest remains sustainable in Norway, however, it will be important to implement the following list of recommendations:

- Develop long-term monitoring programs for game birds to evaluate the population effects of these harvests.
- Harmonize and coordinate seabird monitoring in the Russian and Norwegian areas.
- Initiate and continue special studies for cormorant, greylag geese, and thick-billed murre to improve harvest information on these populations.

Russia

- Improve regional nature conservation activities to implement or improve seabird management plans, conservation laws, and hunting regulations.
- Cooperate with non-governmental organizations to improve outreach programs for conserving seabird populations.

3.2 GENERAL RECOMMENDATIONS

- Improve knowledge of the level of seabird harvests nationally and for specific regions by routinely monitoring the annual harvest of seabirds and at colonies with substantial harvests.
- Develop a permit or license system to improve the information on the number of hunters and their harvests.
- Develop national or regional outreach and education programs to disseminate information on seabird harvests, improve the collecting of harvest information, and reduce unnecessary disturbance at colonies.
- Reduce the harvest of seabird populations which are declining at specific colonies or in specific regions.
- Involve local hunters and hunting organizations in developing or improving harvest regimes.

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APPENDIX A: Scientific names for bird species mentioned in this report (alphabetical order of common English names)

Common name	Scientific name
<i>Bird species</i>	
Aleutian Tern	<i>Sterna aleutica</i>
American White Pelican	<i>Pelecanus erythrorhynchos</i>
Ancient Murrelet	<i>Synthliboramphus antiquus</i>
Arctic Loon	<i>Gavia arctica</i>
Arctic Tern	<i>Sterna paradisaea</i>
Atlantic Puffin	<i>Fratercula arctica</i>
Barnacle Goose	<i>Branta leucopsis</i>
Black Guillemot	<i>Cepphus grylle</i>
Black Scoter (Common Scoter)	<i>Melanitta nigra</i>
Black Tern	<i>Chlidonias niger</i>
Black-footed Albatross	<i>Phoebastria nigripes</i>
Black-headed Gull	<i>Larus ridibundus</i>
Black-legged Kittiwake	<i>Rissa tridactyla</i>
Black-tailed Gull	<i>Larus crassirostris</i>
Bonaparte's Gull	<i>Larus philadelphia</i>
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>
Buller's Shearwater	<i>Puffinus bulleri</i>
California Gull	<i>Larus californicus</i>
Caspian Tern	<i>Sterna caspia</i>
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>
Common Eider	<i>Somateria mollissima</i>
Common Loon (Great Northern Diver)	<i>Gavia immer</i>
Common Murre (Common Guillemot)	<i>Uria aalge</i>
Common Tern	<i>Sterna hirundo</i>
Crested Auklet	<i>Aethia cristatella</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Dovekie (Little Auk)	<i>Alle alle</i>
Flesh-footed Shearwater	<i>Puffinus carneipes</i>
Fork-tailed Storm-Petrel	<i>Oceanodroma furcata</i>
Franklin's gull	<i>Larus pipixcan</i>
Glaucous Gull	<i>Larus hyperboreus</i>
Glaucous-winged Gull	<i>Larus glaucescens</i>
Great Black-backed Gull	<i>Larus marinus</i>
Great Cormorant	<i>Phalacrocorax carbo</i>
Great Skua	<i>Catharacta skua</i>
Greater Shearwater	<i>Puffinus gravis</i>
Greater White-fronted Goose	<i>Anser albifrons</i>
Heermann's Gull	<i>Larus heermanni</i>
Herring Gull	<i>Larus argentatus</i>
Horned Puffin	<i>Fratercula corniculata</i>
Iceland Gull	<i>Larus glaucoides</i>
Ivory Gull	<i>Pagophila eburnea</i>
King Eider	<i>Somateria spectabilis</i>
Kittlitz's Murrelet	<i>Brachyramphus brevirostris</i>
Laysan Albatross	<i>Phoebastria immutabilis</i>
Least Auklet	<i>Aethia pusilla</i>

Appendix A: (cont.).

Leach's Storm-Petrel
Lesser Black-backed Gull
Little Shearwater
Long-billed Murrelet
Long-tailed Jaeger (Long-tailed Skua)
Magnificent Frigate
Mallard
Manx Shearwater
Marbled Murrelet
Mew Gull
Mottled Petrel
Northern Fulmar
Northern Gannet
Oldsquaw (Long-tailed Duck)
Pacific Loon
Pallas's Cormorant
Parakeet Auklet
Parasitic Jaeger (Arctic Skua)
Pelagic Cormorant
Pigeon Guillemot
Pink-footed Goose
Pink-footed Shearwater
Pomarine Jaeger
Razorbill
Red Phalarope
Red-breasted Merganser
Red-faced Cormorant
Red-legged Kittiwake
Red-necked Phalarope
Red-throated Loon (Red-throated Diver)
Rhinoceros Auklet
Ring-billed Gull
Ross's Gull
Sabine's Gull
Shag
Short-tailed Albatross
Short-tailed Shearwater
Slaty-backed Gull
Sooty Shearwater
Sooty Tern
South Polar Skua
Thayer's Gull
Thick-billed Murre (Brünnich's Guillemot)
Tufted Puffin
Western Gull
Whiskered Auklet
White-winged Scoter (Velvet Scoter)
White-winged Tern
Yellow-billed Loon

Oceanodroma leucorhoa
Larus fuscus
Puffinus assimilis
Brachyramphus perdix
Stercorarius longicaudus
Fregata magnificens
Anas platyrhynchos
Puffinus puffinus
Brachyramphus marmoratus
Larus canus
Pterodroma inexpectata
Fulmarus glacialis
Morus bassanus
Clangula hyemalis
Gavia pacifica
Phalacrocorax perspicillatus
Aethia psittacula
Stercorarius parasiticus
Phalacrocorax pelagicus
Cephus columba
Anser brachyrhynchus
Puffinus creatopus
Stercorarius pomarinus
Alca torda
Phalaropus fulicaria
Mergus serrator
Phalacrocorax urile
Rissa brevirostris
Phalaropus lobatus
Gavia stellata
Cerorhinca monocerata
Larus delawarensis
Rhodostethia rosea
Xema sabini
Phalacrocorax aristotelis
Phoebastria albatrus
Puffinus tenuirostris
Larus schistisagus
Puffinus griseus
Sterna fuscata
Catharacta maccormicki
Larus thayeri
Uria lomvia
Fratercula cirrhata
Larus occidentalis
Aethia pygmaea
Melanitta fusca
Chlidonias leucopterus
Gavia adamsii