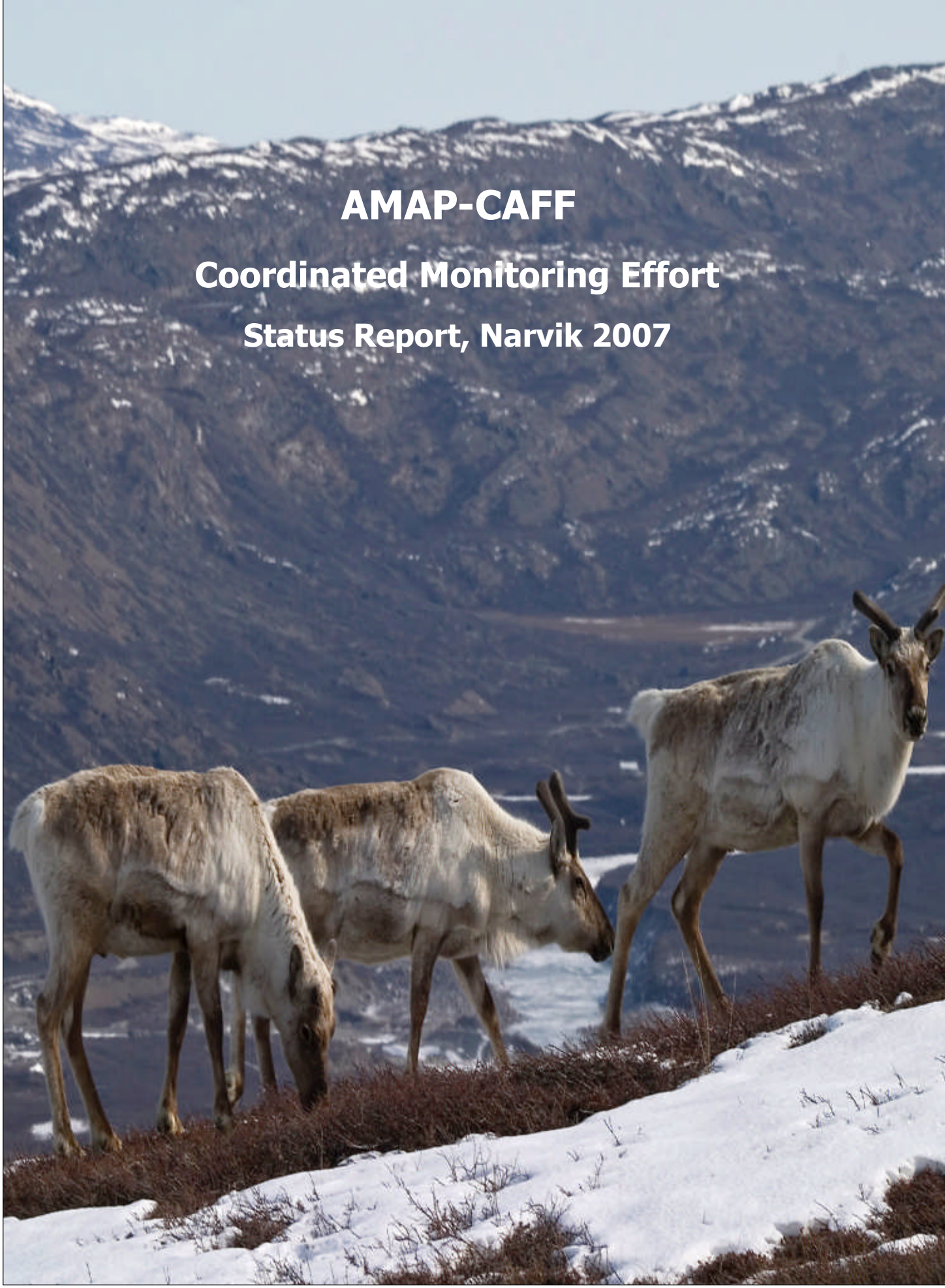
AMAP-CAFF

Coordinated Monitoring Effort

Status Report, Narvik 2007



CAFF
Conservation of Arctic Flora and Fauna

AMAP
Arctic Monitoring and Assessment Programme

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1 Status of AMAP-CAFF Coordinated Monitoring Effort (CME)

AMAP-CAFF cooperation continues to develop. A joint meeting was held in Copenhagen on the 18th September 2007. At this meeting a Green Paper entitled *AMAP-CAFF Coordinated Monitoring Effort* was accepted by both Working Groups (Appendix 1). This paper will help facilitate the integration and harmonizing of monitoring between CAFF and AMAP.

The next step will involve determining the projects that will be included as part of the CME. To this end each country submitted a national list of current monitoring activities that might be suitable for inclusion in the CME. At the joint meeting, each joint delegation determined the most relevant projects that could be considered as pilot projects for the CME. The CME may also be considered as a contribution by the Arctic Council to the Sustaining Arctic Observing Network (SAON) process.

As part of the discussion regarding determination of pilot projects, it was agreed that projects included in the CME are required to meet the following criteria:

- To fulfill the mandates of both CAFF and AMAP
- To have a data management strategy in place
- To have funding for the project in place, and to have existing results from the project
- To have a long-term perspective (not just three or five years)

The draft list of pilot projects for the CME is attached (Appendix 2). When finally endorsed at the national level, each pilot project will present an annual report (approximately two pages) at future Senior Arctic Officials meetings beginning in April 2008. A future joint meeting of AMAP and CAFF is planned prior to the Ministerial meeting in 2009 to further facilitate the CME.

Appendix 1: Green Paper on AMAP-CAFF Coordinated Monitoring Effort

1.1 Introduction

Achieving sustainable development within the Arctic rests on the ability to maintain the integrity of Arctic ecosystems in light of rapidly increasing stressors such as climate change, contaminants, and economic development. In order to support science-based policy and decision-making for the sustainable use and conservation of the Arctic's living resources it is necessary to conduct sustained monitoring of key environmental variables. From it's beginning, the Arctic Council has identified monitoring as a key activity, coupled with assessments that address issues of importance to the Council. Two of the Working Groups of the Arctic Council have a monitoring mandate, the Arctic Monitoring and Assessment Program (AMAP) and the group on Conservation of Arctic Flora and Fauna (CAFF). AMAP's monitoring program is based on ongoing national and international monitoring activities. These are harmonized to the meet AMAP specifications for implementing a coordinated circumpolar monitoring program that is capable of delivering the data to meet AMAP's assessment needs. CAFF's monitoring is implemented through the Circumpolar Biodiversity Monitoring Program (CBMP). The purpose of this paper, is to further explore how AMAP and CAFF can look for opportunities to coordinate their monitoring programs to further strengthen our understanding of the processes driving change across the Arctic and the effects of these changes on Arctic ecosystems, and to identify possible actions to compensate for, or reverse the effects of these changes, with sustainability and sustainable use of Arctic ecosystems as the ultimate goals. The main part of the AMAP – CAFF Coordinated Monitoring will be implemented through National Programs that fulfill AMAP and CAFF needs.

1.2 AMAP monitoring

Priority issues covered by AMAP monitoring activities include the levels, trends and effects (on biota and humans) of specific contaminants (persistent organic pollutants – POPs, heavy metals, radionuclides, etc.) that are present in the physical environment or carried in the tissues of organisms. AMAP monitoring priorities also include the environmental consequences and effects of global climate change, stratospheric ozone depletion, the effects of pollution on environment and human health, and the combined effects of pollutants and other stressors on ecosystem components and humans. [1]

[1] A Strategy for Coordination of Monitoring Activities between CAFF and AMAP. Submitted to AC Ministers, November 2004. This document began the process of coordination by outlining the general approach to be used.

1.3 CAFF monitoring

The priority for CAFF's monitoring activities is monitoring species, their habitats and ecosystems, including population sizes and distributions; reproductive health and survival; food web and ecosystem integrity - including marine, terrestrial, coastal and freshwater; migration patterns; and assessment of the effects of climate change and other impacts both natural and human-induced, on biodiversity. This type of monitoring provides an overall view on the status and trends of species that live and breed in the Arctic and their habitats, on different/various temporal and spatial scales, and ecosystem health at large.[2]

1.4 An ecosystem-based approach to monitoring

If the monitoring strategies of the two Working Groups are viewed from the perspective of an integrated ecosystem-based approach (EBA), the manner in which the two monitoring programs fit together becomes clearer.

CAFF has the responsibility for monitoring ecosystems from the standpoint of species, their populations, habitats, and impacts on biodiversity resulting from a suite of stressors. AMAP is monitoring many of the relevant stressors, and their effects on Arctic ecosystems, e.g. climate change parameters, contaminants and UV radiation.

By bringing data series for the two monitoring programs together, a strong approach that can forge to maintain ecosystem health and structural integrity, resiliency, and sustainability. AMAP assessments of 1997 and 2002 demonstrated the potential for linkages between contaminant transport pathways and fate, and changes in climate and UV radiation. The ACIA report demonstrated that climate change will cause changes in biodiversity, but also noted that local human actions can be more influential on biodiversity in some cases than broad scale pressures of climate change.[3] To most accurately assess the changing state of the Arctic environment, and evaluate the causes for change, simultaneous measurement of physical climate variables, contaminant loadings, and biodiversity are essential.

Ultimately, this type of ecosystem-based approach relates back to the Indigenous and other local people, and sustainability of Arctic communities where people depend on biodiversity and ecosystem health for food, economic sustenance, and preservation of culture. Human health depends in part on stressors such as contaminants (e.g. in food), and UV radiation. Through a better, more comprehensive understanding of species and their populations, and the stressors affecting change to these populations, we may also identifying the stressors affecting the economic, social and cultural fabric of Arctic communities.

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[2] Ibid.
[3] Arctic Climate Impact Assessment (ACIA). November 2004

1.5 Goals of the Coordinated Monitoring Effort

1. Form a more complete picture of the overall state of Arctic ecosystems, and their extent of structural integrity, resiliency, and sustainability.

2. Identify and/or quantify stressors affecting sustainability of Arctic ecosystems, and therefore the Arctic's living resources.

3. Seek efficiencies of operation as directed by the SAOs

To achieve these goals, the following objectives are proposed.

1.6 Objectives of the Coordinated Monitoring Effort

1. As far as possible take advantage of approaches already accepted by the Arctic Council (e.g., integrated ecosystem-based approach, large marine ecosystems) bring the existing data of the two monitoring programs together where possible for analyses.

2. To achieve a more cost efficient collection and storage of data, and a better use of the data collected in assessments and research.

3. Identify areas of commonality (species and/or sites and/or ecosystems), where data from the two programs *already exist* within national monitoring programs and analyze how the data overlap, where the linkages are, what the data is signifying, and where the gaps lay.

4. Based on the gap analysis, initiate projects to fill these gaps.

5. Establish better linkages between the findings of this coordinated monitoring program with those of other programs, within and outside the Arctic, in order to broaden the scope of understanding of the potential impacts of Arctic and global change.

6. Communicate the findings of this coordinated monitoring effort in published reports and maps, for use by policy-makers, environmental managers, indigenous people's organizations, international organizations, and the general public.

1.7 Proposed Approach to Initiating the Coordinated Monitoring Effort

For practical purposes, the coordinated effort will be based initially on activities already underway. Most of these activities are implemented at the national level. However, it may be necessary to propose relevant new components, e.g. if programs found in some Arctic

countries are not found in some others. As the coordinated effort matures, there may be increased opportunity for bi- or multi-national components.

Completion and acceptance of this Green Paper by both AMAP and CAFF are the first steps in initiating the coordinated effort.

Within each of the eight Arctic Council Member States, the AMAP Head of Delegation and the CAFF National Representative have identified examples of relevant on-going national monitoring activities. These activities are summarized in Table 1. Processing the information within Table 1, may require a joint meeting of the AMAP HoDs and CAFF NRs, augmented as needed by relevant experts, where the on-going activities of greatest relevance to the coordinated effort will be decided and proposed as initial activities. Over the course of 2007, the coordinated will continue to evolve and produce its initial products.

1.8 Expected High Priority Activities for the Initial Coordinated Effort

At CAFF's CBMP meeting in November 2006, and at the AMAP Climate Workshop in June 2005, experts noted that use of "integrated monitoring sites" is one of the best approaches for implementing monitoring of the type suitable for the coordinated AMAP-CAFF effort. The definition of a "site" is flexible and should be left to the countries and scientists to define, as they need. It will be clarified how the work can be coordinated with the ongoing work to establish a Sustainable Arctic Observing Network (SAON). Another good approach is a species network, for example projects on polar bears or reindeer, that evaluate the role of environmental factors, e.g. climate and contaminants, on their health and population trends in a way that allows data and information to come together and give a broader perspective.

It should be easy for the AMAP and CAFF representatives to identify relevant existing integrated monitoring sites or nodes in a species network that support the broad objectives of the coordinated effort. Once identified, these on-going activities would be considered as high priority candidates for inclusion in the coordinated effort.

Appendix 2: List of Potential Pilot Projects (This list is still in development and has not yet been finalized)

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Canada	ITEX (International Tundra Experiment) - Selected Sites	Monitor changes in arctic vegetation in relation to climate	Broad number of tundra species	Circumpolar	Greg Henry, University of BC
Canada	CircumArctic Rangifer Monitoring and Assessment Network (CARMA Network)	Caribou population trends - assessing mechanism of population change based on monitoring of health and body condition, demographic parameters and habitat conditions from herds throughout the Arctic	Canadian caribou herds	Canadian Arctic	Mary Gamberg, Yukon Contaminants Committee, Don Russell, Yukon College, Wendy Nixon, Environment Canada
Canada	Arctic Biodiversity of Char - Network for Monitoring and Research	An integrated, multidisciplinary study of Char along latitudinal and longitudinal gradients. It involves contaminants analysis. A component of the Char IPY project addresses char biodiversity and the development of a network to foster assessment and monitoring of such	Anadromous char and lacustrine char from the high Arctic	The high Arctic	Marlene Evans and Derek Muir (EC), Jim Reist (DFO).
Canada	Beluga	Examining beluga ecology and contaminant uptake in the Beaufort Sea, where there is a relatively long time series of beluga data, going back to the 1980s	Beluga	The Beaufort Sea	NCP and ArcticNet projects led by Gary Stern and Steve Ferguson (DFO).
Canada	Seabirds	Monitoring of seabirds at several colonies	Northern fulmar, thick-billed murre, and may also include black legged kittiwake, black guillemot, glaucous gull, and ivory gull	The Canadian Arctic, including Prince Leopold, Coats, and Digges Islands	Grant Gilchrist, Tony Gaston and Mark Mallory (EC)
Canada	Seabirds	The collection and analysis of seabird eggs annually	Thick billed murre and northern fulmar	Prince Leopold Island and Coats Island	An NCP Project led by Birgit Braune of EC
Canada	Polar Bears	The monitoring of population levels and contaminant levels in polar bear from seven polar bear management zones. An NCP project (led by Rob Letcher of EC) monitors contaminant levels in polar bear from seven polar bear management zones throughout the Canadian Arctic. This work is carried out in cooperation with other existing	Polar Bears	Seven polar bear management zones throughout the Canadian Arctic	An NCP project led by Rob Letcher of EC and population biology led by Ian Stirling, Nick Lunn (EC) and Andrew Derocher (Univ of Alberta)

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
		programs and includes collaboration from Mitch Taylor and John Nagy in Nunavut and NWT respectively, as well as Ian Stirling and Nick Lunn (EC), and Andrew Derocher (University of Alberta). This work also contributes to a Canadian IPY project which is assessing the effects of climate change and contaminants on the ecology of polar bears and is linked into a circumpolar IPY initiative (BEARHEALTH).			
Canada	Ringed Seals	Ongoing studies of ringed seal population demographics (population size, productivity, survivorship, etc.), ecosystem structure, climate change impacts, key habitats, diet and contaminant loads since 1992. Cooperates with NCP project (Derek Muir) in the collection of specimens and data from the Western Arctic. At some locations the time series for contaminants goes back to the 1970s	Ringed Seals	Western Arctic	Lois Harwood, Yukon College, DFO and Inuvialuit Game Council
Canada	Ringed Seals	Ringed seals are also monitored at 15 sites throughout the Arctic. Cooperates with Lois Harwood project in the collection of specimens and data from the Western Arctic. At some locations the time series for contaminants goes back to the 1970s	Ringed Seals	The Canadian Arctic	NCP project led by Derek Muir of EC
Finland	Big, deep oligotrphic lakes	Monitoring of bioaccumulation compunds in inland and coastal waters, and Fish resources	Inland and coastal waters, and Fish resources		
Finland	Pallas	Monitoring of heavy metal and nitrogen deposition by means of mosses Monitoring of harmful substances in the boreal forest food chain, Monitoring birds of prey. Long-tern Socio-Ecological Research (LTSER). The Multi-diciplinary Integrated Monitoring	The Boreal food chain, air quality		Outi Mähönen.

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
		program (ICP IM), and Deposition and air quality in background areas			
Greenland Faroes Denmark	Zackenberg Basic (Integrated ecosystem monitoring in the High Arctic, North East Greenland) - http://www.zackenberg.dk	The Zackenberg Basic monitoring program focuses on providing long time series of data on the dynamics of a High Arctic ecosystem.	A broad variety of abiotic parameters and organisms and processes. Most abiotic and biotic parameters are monitored year-round. Other abiotic parameters and most biological parameters are monitored intensively in late May through August	Zackenbergdalen and the adjacent fjord, Young Sound, in Northeast Greenland. The study area is the drainage basin of Zackenberg River with an area of app. 500 Km2	Scientific coordinator, Mads Forchammer (mcf@dmu.dk), National Environmental Research Institute
Greenland Faroes Denmark	Nuuk Basic, (Integrated ecosystem monitoring in the Low Arctic, South West Greenland.)	The Nuuk Basic monitoring program focuses on providing long time series of data on the dynamics of a low arctic ecosystem	Each subprogram in Nuuk Basic monitors a broad variety of abiotic parameters and organisms and processes. Most abiotic and several biotic parameters are monitored year-round, whereas other abiotic parameters and most biological parameters are monitored intensively in early May through October. The program does not include the monitoring of contaminants	The Nuuk Basic monitoring is conducted in and around Kobbefjord and Godthåbsfjord in Southwest Greenland	Scientific coordinator, Morten Rasch, Danish Polarcenter (mr@fist.dk)
Greenland Faroes Denmark	ENVOFAR - Environmental monitoring data on the Faroe Island ecosystem"	To provide a more direct and user-friendly access to the environmental data gathered in the Faroese region	ENVOFAR is intended to have an open framework, which can expand as new parameters or problems enter. Most data can, however, be grouped into one of three categories:• Biodiversity, Climate, Contaminants	The cooperation is centered around the Faroe Island ecosystem including the terrestrial environment and the marine ecosystem and ocean currents passing along this	Terrestrial biodiversity: Anna Maria Fosaa, anmarfos@ngs.fo; Marine biodiversity:Birds: Bergur Oslen, BergurO@frs.fo;Ocean Ocean and climate: Bogi Hansen, Bogihan@ngs.fo
Iceland	Murre Populations and Climate Change	Trend data for circumpolar populations; Associated with CAFF CBird Work Plan and International Murre Conservation Strategy	Thick-billed Murre Uria lomvia; Common Murre U. aalge; marine ecosystem	Iceland: two colonies	Aevar Petersen (aevar@ni.is), in connection with CAFF/CBird

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Iceland	Black-legged Kittiwake populations and Climate Change	Trend data for circumpolar populations; Associated with CAFF CBird Work Plan	Black-legged Kittiwake Rissa tridactyla; marine ecosystem	Iceland: muliple colonies	Aevar Petersen (aevar@ni.is), in connection with CAFF/CBird
Iceland	ITEX and a new associated Highland Ecosystem Project	ITEX is a CBMP Network	Terrestrial ecosystem	Iceland: 2 sites	Ingibjorg S. Jonsdottir
Iceland	Common Eider and Climate change	Population trends related to climate change models; Started 2007; Linked to CAFF CBird Work Plan and the International Eider Conservation Strategy	Common Eider Somateria mollissima; marine ecosystem	Iceland: multiple colonies	Tomas G. Gunnarsson
Iceland	Black Guillemots and Contaminants	Trends in and age-related effects of contaminants.	Black Guillemot Cepphus grylle; marine ecosystem	Iceland: one region	Aevar Petersen
Iceland	Gyrfalcon and Contaminants	Trends in contaminants.	Gyrfalcon Falco rusticolus; terrestrial ecosystem	Iceland	Olafur K. Nielsen
Iceland	White-tailed Eagles and Contaminants	Trends in contaminants and effects on population.	White-tailed Eagle Haliaetus albicilla; marine ecosystem	Iceland	Kristinn H. Skarphedinsson
Iceland	In Lake Þingvallavatn, plankton, arctic char, nutrients, contaminants	Protection and monitoring of the lake	Started in 2007. Plankton, chemistry, and actic char life history		Gunnar Steinn Jónsson Umhverfisstofnun
Norway	National Monitoring of the Marine Environment and Living Resources	Monitoring of sea environment with special focus on sustainable fisheries management	Physical and chemical parameters, zooplankton, phytoplankton, fish eggs and larvae, several fish species, prawn, lobster, benthic ecosystems	Barents Sea and Norwegian Sea	Contact person: Jarle Klungsøyr, +4755238498, jarle.klungsoeyr@imr.no, Lead: Norwegian Institute of Marine Research (IMR)
Norway	National Coastal Monitoring	Monitoring of the state of environment related to nutrients and biodiversity	Hydrology/-chemistry and plankton, soft and hard bottom ecology	Coastal areas in Norway	Contact person: Karen Fjøsne, SFT, +4722573468, karen.fjosne@sft.no(Frithjof Moy, NIVA)

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Norway	Joint Assessment and Monitoring Programme (JAMP) under OSPAR (incl. contaminants and biodiversity elements) – (1981-)	Analyses of contaminants in sediments and organisms	Sediments and benthic organisms	Norwegian coastal waters	Contact person: Jon L. Fuglestad, SFT, +4722573726, jlf@sft.no(Norman Green, NIVA)
Norway	Offshore monitoring of the Norwegian petroleum activities	Monitoring of pollutants and species diversity in sediments in the vicinity of offshore installations. Monitoring of uptake and effects of pollutants in mussels and fish	Sea bed fauna/ biodiversity/ ecosystems. Fish and caged blue mussels in water column	The whole Norwegian shelf where there is oil and gas activities	Contact person: Per Erik Iversen, SFT, +4722573484, pei@sft.no
Norway	Contaminants in Polar bear in the Svalbard area – NPI (1991-2005)	MOSJ	Ursus maritimus	Svalbard	Contact person: Geir W. Gabrielsen, NPI, +4777750529, geir.wing.gabrielsen@npolar.no
Norway	Population ecology of Polar bear in the Svalbard area (1967-)	MOSJ	Ursus maritimus	Svalbard	Contact person: Magnus Andersen, NPI, +4777750534, magnus.andersen@npolar.no
Norway	Polar bear population in the Barents Sea (Russian/Norwegian monitoring) – (2005-)	Long term monitoring of population size by aerial line transect surveys	Ursus maritimus	Barents Sea, Svalbard, Frantz Josef Land, Novaja Zemla	Contact person: Jon Aars, NPI, +4777750524, jon.aars@npolar.no
Norway	Norwegian international research site	A comprehensive research site that includes several research stations established by other nations. It will be necessary to prepare and coordinate the required outputs	Multiple monitoring activities	Ny Ålesund at Spitsbergen, Svalbard	The Norwegian Polar Institute. http://npiweb.npolar.no/. Email: postmottak@npolar.no Phone: +47 77 75 05 00 Fax: +47 77 75 05 01

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Russia	"The Annals of Nature" in nature reserves	Studying and monitoring of natural processes and phenomenon in complexes of natural reserves	Mostly key and endangered species of animals and plants and broad phenological observations	Territory of Russia	Yuriy Buivolov (oopt_rf@mnr.gov.ru) (Rosprirodnadzor)
Russia	Hunting animals monitoring	Regular counting of hunting mammals and birds	Some species of animals officially recognized as hunting ones	Territory of Russia	Juliy Gubar (ulgubar@mail.ru) (Information and Analitical Centre for Hunting Animals and Habitats)
Russia	The International Breeding Conditions Survey on Arctic Birds (ABBCS)	This project aims at collating information on environmental conditions on breeding grounds of Arctic nesting birds in a updating database	Birds, rodents	Circumpolar Arctic	Mikhail Soloviev (soloviev@soil.msu.ru)(Moscow State University) and Pavel Tomkovich (pst@zmmu.msu.ru) (Zoological museum of the Moscow State University)
Russia	UNEP/GEF ECORA Project	Development and implementation of the Integrated Ecosystem Management in three model areas in the Russian Arctic	Waterfowl (NAO, Sakha, ChAO), reindeer (NAO, Sakha), endangered bird species (ChAO), seabirds (ChAO), marine mammals (ChAO)	Three Model Areas: Kolguev Island (Nenets AO), Lower Kolyma River (Sakha Republic), Beringovsky region (Chukotka)	Evgeny Kuznetsov (ecohealth@mtu-net.ru)

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Russia	Information Cooperative Centre of Monitoring of Russian Arctic biodiversity	Interdepartmental cooperation and the methodical help on gathering, processing and dissemination of information on biodiversity of the Russian sector of Arctic	Arctic species and ecosystems of Russia	Russian Arctic	Arkady Tishkov (tishkov@biodat.ru) (Institute of Geography of the Russian Academy of Sciences (IGRAS), and Evgeny Kuznetsov (ecohealth@mtu-net.ru) (All-Russia Research Institute of Nature Protection (ARRINP) and UNEP/GEF ECORA Project)
Sweden	Marine macro benthos	To detect possible long-term changes of soft bottom macro benthos species distribution and abundance in relation to eutrophication and oxygen depletion	Marine soft bottom ecosystem	Swedish coastal and offshore waters.	Mr Sverker Evans, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1302. Sverker.Evans@naturvardsverket.se
Sweden	Marine coastal fish populations	Integrated studies of coastal fish with respect to population development, health status and concentrations of POPs and metals	Stationary coastal fish in the North Baltic Sea. Coastal brackish ecosystems	One area in the Northern Baltic Sea (plus two areas in non-arctic environments)	Ms Tove Lundeberg Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1611. Tove.Lundeberg@naturvardsverket.se

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Sweden	Marine top predators	To follow the population development of and health status of marine top predators, particularly with respect to impacts of POPs.	White-tailed eagle (Haliaeetus albicilla), grey seal (Halichoerus grypus), harbour seal (Phoca vitulina) and ringed seal (Phoca hispida).	Swedish coastal area	Ms Tove Lundeberg, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1611. Tove.Lundeberg@naturvardsverket.se
Sweden	Metals and POPs of marine biota	To follow long-term trends of concentrations of metals and POPs in marine organisms.	Fish, blue mussel (Mytilus edulis), guillemot.	Swedish coast including Arctic areas	Ms Tove Lundeberg, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1611. Tove.Lundeberg@naturvardsverket.se
Sweden	Freshwater ecosystem monitoring	The overall objective of the Swedish national monitoring of freshwater is to describe the state and changes in the environment. In addition to the national program fresh water monitoring is also per-formed on a regional level by the county administrative boards	Lakes and rivers. In some objects, only chemical parameters are measured, but in others, fish, zoo-plankton, phytoplankton, and benthic fauna are monitored	Nationwide. Within CAFF area, 8 lakes and 9 rivers are monitored intensively. Extensive inventories (normally every sixth year) include more objects	Mr Håkan Marklund, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1406. Hakan.Marklund@naturvardsverket.se

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Sweden	Swedish national inventory of forests (RIS)	RIS is a yearly inventory of forest and forest soils, based on a systematic sample of field plots. It is comprised of the National Forest inventory (NFI), which focuses on the tree layer but also on other parts of the vegetation, and the Swedish Forest Soil Inventory (MI), which takes care of the below-ground environmental conditions. While the emphasis has historically been on forest as a nature re-source, biodiversity aspects have been included in the programme in later years	All species of trees and bushes are monitored, as is a sample of species in the field and bottom layers (dwarf shrubs, herbs, mosses, lichens) and some epiphytic lichens. Anthills, traces of woodpecker feeding activity, and the fruiting bodies of some wood-living fungi are also monitored. Even if focus is on forests, other natural and semi-natural terrestrial habitats are also monitored	Nationwide. However, in the north, only zones where conifers grow is field monitored. Thus, the sub-arctic birch forest zone and the zones above are excluded	RIS-NFI: Mr Göran Ståhl, Swedish University of Agricultural Sciences (SLU), Department of Forest Resource Management, S-901 83 Umeå. Tel. +46 90 786 84 59, Goran.Stahl@resgeom.slu.se
Sweden	National Inventory of Landscapes in Sweden (NILS)	The aim of NILS is to monitor aspect of landscape composition, biodiversity, cultural heritage and N2000 biotopes. It is based on a systematic sample of 5 x 5 km plots, which are mapped by interpretation of false colour air photos, and subsequently visited in the field. It is a yearly program, but each plot is mapped and visited every 5th year	All terrestrial ecosystems are covered, including wetlands and shores. Monitored species include: all forest and bush species, a selection of vascular plants, lichens and mosses in the field and bottom layers. Two species of epiphytic cyanolichens are also monitored. In addition, capercaille, black grouse, hazel grouse and ptarmigans are observed	Nationwide. Of 620 5 x 5 km plots, ~130 is in the CAFF area	Mr Ola Inghe, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1571. Ola.Inghe@naturvardsverket.se
Sweden	Monitoring of small mammals	The aim is to monitor trends in small mammal populations, both as an impact indicator for e.g. toxic pollutants and climatic change, and as cornerstone species for higher trophic levels (vertebrate predators).	Biyearly trapping of voles, lemmings, and shrews at 2 forest-dominated sites and 3 mountain (subalpine-alpine) sites.	South-central to northern Sweden. Two of the mountain site are within the CAFF area, and the third is near outside	Mr Ola Inghe, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1571. Ola.Inghe@naturvardsverket.se

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
Sweden	Monitoring of predators	The objective is to monitor five predator species to be able to manage their populations in a proper way.	The predators are Lynx, wolverine, wolf, brown-bear and golden eagle.	Nationwide. However, those species are all of great importance in the CAFF area and half of the budget is allocated to this area.	Mr Robert Franzén, Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 13 67. Robert.Franzen@naturvardsverket.se
Sweden	Screening of chemical substances	Screening mainly of POPs in all kinds of media including arctic and subarctic animals to identify substances which potentially can cause health and environmental problems	Humans, birds and fish.	All over Sweden	Ms Britta Hedlund Naturvårdsverket [Swedish Environmental Protection Agency], S-106 48 STOCKHOLM. Tel. +46 8 698 1208. Britta.Hedlund@naturvardsverket.se
U.S.	Russian-American Long-term Census of the Arctic (RUSALCA)	Gathering long-term observations to improve understanding of the causes and consequences of the reduction of sea ice cover in the Northern Bering Sea and Chukchi Sea.	Zooplankton, fish larvae, fish, and benthos	From St. Lawrence Island in the Bering Sea northward into the Chukchi Sea and into the Canada Basin. The region includes both U.S. and Russian territorial waters	Kathy Crane of the U.S. National Oceanic and Atmospheric Administration Kathy.Crane@noaa.gov
U.S.	North Pacific Climate Regimes and Ecosystem Productivity (NPCREP)	Two objectives 1) To monitor changes in coastal marine ecosystems through a network of in situ and remote observing systems; 2) To develop biophysical indicators and models that meet the needs of marine resource managers to adapt to predicted climate-induced changes in living marine resources	The North Pacific Climate Regimes and Ecosystem Productivity (NPCREP)	The eastern Bering Sea and the Gulf of Alaska	Kenric Osgood (National Oceanic and Atmospheric Administration) - kenric.osgood@noaa.gov.

Country	Title of program:	Broad objectives of the program	Specific species and/or ecosystems included	Geographic coverage	Contact person
U.S.	Seabird Tissue Archival and Monitoring Project (STAMP)	Using seabird eggs to investigate the geographic and temporal patterns in legacy contaminants, mercury, organotin compounds, and emerging contaminants of recent concern in at Alaska seabird colonies and in Alaska marine ecosystems	Five seabird species were selected by STAMP: common murres (Uria aalge; COMU) and thick-billed murres (U. lomvia; TBMU); black-legged kittiwakes (Rissa tridactyla: BLKI); and glaucous gulls (Larus glaucescens; GLGU) and glaucous-winged gulls (L. hyperboreus; GWGU)	From the Chukchi Sea, through the Bering Sea out to the end of the Aleutian chain (with efforts underway to include the Commander Islands in Russia), and through the Gulf of Alaska south to Washington State (with plans to include colonies in California).	Dave Roseneau (U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge) (Dave_Roseneau@fws.gov) and Paul Becker (National Institute of Standards and Technology, Hollings Marine Laboratory) (Paul.Becker@noaa.gov)
U.S.	Circumpolar seabird monitoring program	Monitor population and productivity parameters of selected seabirds at the circumpolar scale	Glaucous Gull, Black-legged Kittiwake, Northern Fulmar, Arctic Tern, Leach´s Storm Petrel, Ivory Gull, Crested Auklet, Common Murre, Thick-billed Murre, Puffins, Common Eider, Guillemots, King Eider	Selected seabird colonies throughout the Arctic Region	Dr. David Irons, US Fish and Wildlife Service (David_Irons@fws.gov)
US	Circumpolar monitoring strategy for ringed seals	Monitor population status, reproductive rates, distribution, and contaminants in ringed seals.	Ringed seals; marine	Circumpolar	Dr. Michael Simpson, Marine Mammals Commission, Bethesda, MD, USA