



# Arctic Bulletin



No 1.03 • PUBLISHED BY THE WWF INTERNATIONAL ARCTIC PROGRAMME



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## WWF Arctic Bulletin

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## Date of publication:

March 23, 2003  
ISSN 1023-9081

## Cover:

Fur Seals, Pribilof Islands, Alaska.  
Photo: Brooks Kraft.

Printed at Merkur-Trykk AS  
on 100% recycled paper.

*This publication was made possible  
through the support of WWF-Netherlands.*



## Editorial

# Alaska: a cautionary tale

For many northern communities and governments, exploitation of oil, gas and minerals seems like a one-way ticket to jobs, a higher standard of living and increased revenue for government programs. The story of Alaska's North Slope should make governments think twice. Non-renewable resources do not last forever. When they're gone, they leave in their wake environmental damage, a tremendous clean-up bill, lots of aging infrastructure and a revenue gap that is hard to fix.

Alaska's North Slope began producing oil in 1977. At its peak, Alaskan oil production totalled two million barrels per day and provided 20 percent of US oil consumption. Revenues brought wealth and much-improved social services to communities on the North Slope. Because of oil revenues, Alaska residents still do not pay state income and sales tax, and the Arctic Slope Regional Corporation, a Native-owned corporation of the Inupiat that manages and invests revenues from leasing their North Slope lands to oil companies, has grown to a Fortune 500 company with 6,000 employees.

But now, 36 years later, oil production in Alaska has fallen by more than 50 percent from its 1988 peak. The State of Alaska faces a \$900 million USD budget shortfall. The new governor, Frank Murkowski, just announced plans to cut state government and lay off state employees, charge user fees for a number of state services, and impose either a seasonal sales tax or a once-a-year payroll tax. Personal income for Alaskans has fallen from high above the US national average to about even. The biggest oil producer in Alaska, BP, made substantial cuts its Alaskan staff last year, and is not bidding on new leasing areas west of the existing oilfields or in offshore tracts in the Beaufort Sea. In short, it will be difficult for Alaskans to maintain both the employment opportunities and government services that the oil age brought to this state.

Alaska's oil riches came at a high price. The National Research Council, part of the US National Academy of Science, recently issued a report to the US government about the cumulative effects of oil operations on Alaska's North Slope. Although there are effects on some wildlife populations, the greatest impacts come from the 2,600 square kilometers of industrial sprawl – roads, gravel pads and other infrastructure, that destroys the wilderness quality of the land and contributes to dust, flooding and thawing of permafrost. The report's most disturbing conclusion is that this massive accumulation of infrastructure is unlikely to be removed, or disturbed habitat restored, when oil operations cease.

Though the days of production from huge Alaskan oil fields are probably gone, oil and particularly gas production in Alaska will continue on a smaller scale. The environmental cost is likely to be significantly higher. Alaska's continued emphasis on oil and gas development will almost certainly require exploitation of a number of smaller, less productive fields in new regions such as the vast National Petroleum Reserve – Alaska, with the necessary infrastructure spread over a much larger area.

But oil and gas aren't Alaska's only resources. Alaska is rich in natural beauty, wildlife and dramatic landscapes. Nearly 300,000 square kilometers in Alaska are protected under Alaskan or US federal law; this includes 50 percent of Alaska's arctic territory. These protected areas provide world-class nature experiences for Alaskans and tourists.

From a conservation point of view, well-managed nature-based tourism is a far more sustainable road to economic development than oil and gas exploitation. The long-term costs, for example for restoring habitats, are certainly lower. And revenues, particularly from tourism that hires locally and uses local suppliers, can be significant. Last summer, 1.2 million tourists visited Alaska, and left behind them 1.4 billion US dollars.

It's unfortunate, then, that nature-based tourism doesn't seem to be on the radar screen of Alaska's government. The new governor has said that increased natural resource exploitation, particularly oil and gas, will be Alaska's road to economic development. This development will over time reduce the product – nature on the biggest possible scale – that is one of the most significant bases for the Alaskan tourism industry, and the quality that sets Alaska apart from other destinations. Instead of oil and gas, the Alaskan government – and Alaskans – should look to tourism and other sustainable nature uses for the long term.



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United States National Academy of Sciences, <http://www.nas.edu/>  
United States Energy Information Agency, <http://www.eia.doe.gov/>

# NGOs call on banks not to fund dam and smelter project in Iceland

An international coalition of 120 environmental organisations has called on private banks and international financial institutions not to provide any funds for the large Kárahnjúkar dam and aluminum smelter project in Iceland.

Iceland's National Power Company and the Alcoa Corporation signed the project's power contract on March 15.

If built, the Kárahnjúkar project

will consist of nine dams, three reservoirs, a series of tunnels and river diversions, and a 690-megawatt power plant. Iceland's National Power Company intends to raise funds for the Kárahnjúkar project from the European Investment Bank (EIB), the Nordic Investment Bank (NIB) and private banks.

INCA, IRN, the CEE Bankwatch Network, Friends of the Earth International and WWF's

International Arctic Programme have called on the EIB, the NIB and all banks that have funded the National Power Company in the past not to provide any funds for the Kárahnjúkar project. The NGO appeal was endorsed by 120 organizations from 47 countries.

If built, the project will have massive environmental impacts on Iceland's Eastern Highlands.

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## Thjorsarver wetlands saved



Photo: Jóhann Ott Hilmarsson

The Thjorsarver wetlands in the central highlands of Iceland have been saved from development.

Landsvirkjun, the national power company in Iceland, had submitted plans last year to build a 30-square kilometre reservoir and dam for hydropower.

But opposition to the project from the public and scientists was enough to persuade Jon Kristjánsson that the Thjorsarver

wetlands must remain intact.

Kristjánsson was appointed as a special minister by the Icelandic Government to decide whether the project could go ahead.

The issue of building a dam in the Thjorsarver wetlands is particularly controversial since the wetlands were made a Ramsar site in 1992.

A smaller reservoir of three square kilometres will still be built but it will now no longer impact the

wetland area. Iceland's obligations according to the Ramsar Convention will be fully upheld.

The Thjorsarver wetlands have been threatened by hydropower developments for more than 30 years. Plans to dam the Thjorsa River, the longest in Iceland, would have submerged part of the unique ecosystem and threatened wetlands above the reservoir with soil erosion from its banks.

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# Arctic university's first successes

The promise of a circumpolar university is now a reality, with the first students completing the University of the Arctic's *Introduction to the Circumpolar World*, an online course that is part of the Bachelor of Circumpolar Studies (BCS) program.

The University of the Arctic (UArctic) aims to reduce barriers to higher education in the North, and improve circumpolar cooperation in education.

The common thread that runs through UArctic's introductory course, and all of the subsequent courses of the Bachelor of Circumpolar Studies, is sustainability.

Rather than being divided into traditional academic disciplines, the course's subjects come straight from contemporary issues in the Arctic. The impact of global climate change on the Arctic, for example, is approached from a variety of perspectives, from the physical processes, to the international legal instruments, and local and regional adaptations.

Nearly 30 students from six different northern universities and colleges participated in the pilot programme, where they learned about their region both from this



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new and innovative curriculum, and from each other.

The Bachelor of Circumpolar Studies' emphasis on circumpolar cooperation and sustainability is also reflected in other University of the Arctic programmes, such as the Northern Research Forum, the UArctic Field School and PhD Networks.

While the BCS provides basic education for students earning their first degree, these other programs give UArctic the flexibility to address a variety of learning needs in the region.

The Northern Research Forum forges a dialogue between academics, decision makers and local stakeholders on prominent issues facing the northern region. The Field School and PhD Networks give research, cooperation, and training opportunities to graduate students and researchers.

An *Expert Course in Environmental Impact Assessment* is currently developing in partnership with RAIPON, the Saami Council and UNEP. Rather than educating resource managers or administrators, the course is aimed at giving local indigenous people and their communities the competencies to engage in dialogue with outside developers and other interests.

For more information on the University of the Arctic and its activities, please visit [www.uarctic.org](http://www.uarctic.org).

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## Polar anniversary

The next International Polar Year (IPY) will take place in 2007, the 125th anniversary of the first.

The 2007 IPY program will use new and present technologies to determine causes and effects of climatic variability, including air, sea, ice interactions, and lithosphere dynamics, including the evolution and history of crust and sedimentary cover.

The first polar year was held in 1882–3 after Austrian Navy Lieutenant Karl Weyprecht (pictured) successfully campaigned to



raise the profile of scientific study over polar exploration.

This was followed by a second polar year from 1932–33. The third IPY evolved into the International Geophysical Year (IGY) 1957–58 with a broader geographical scope.

Leonard Johnson, from the University of Alaska, and a co-coordinator of IPY, said: "Both the International Polar Year from 1882–83 and the associated International Geophysical Year from 1957–58 were major initiatives leading to significant new insights into global processes and ulti-

mately to decades of valuable polar research.

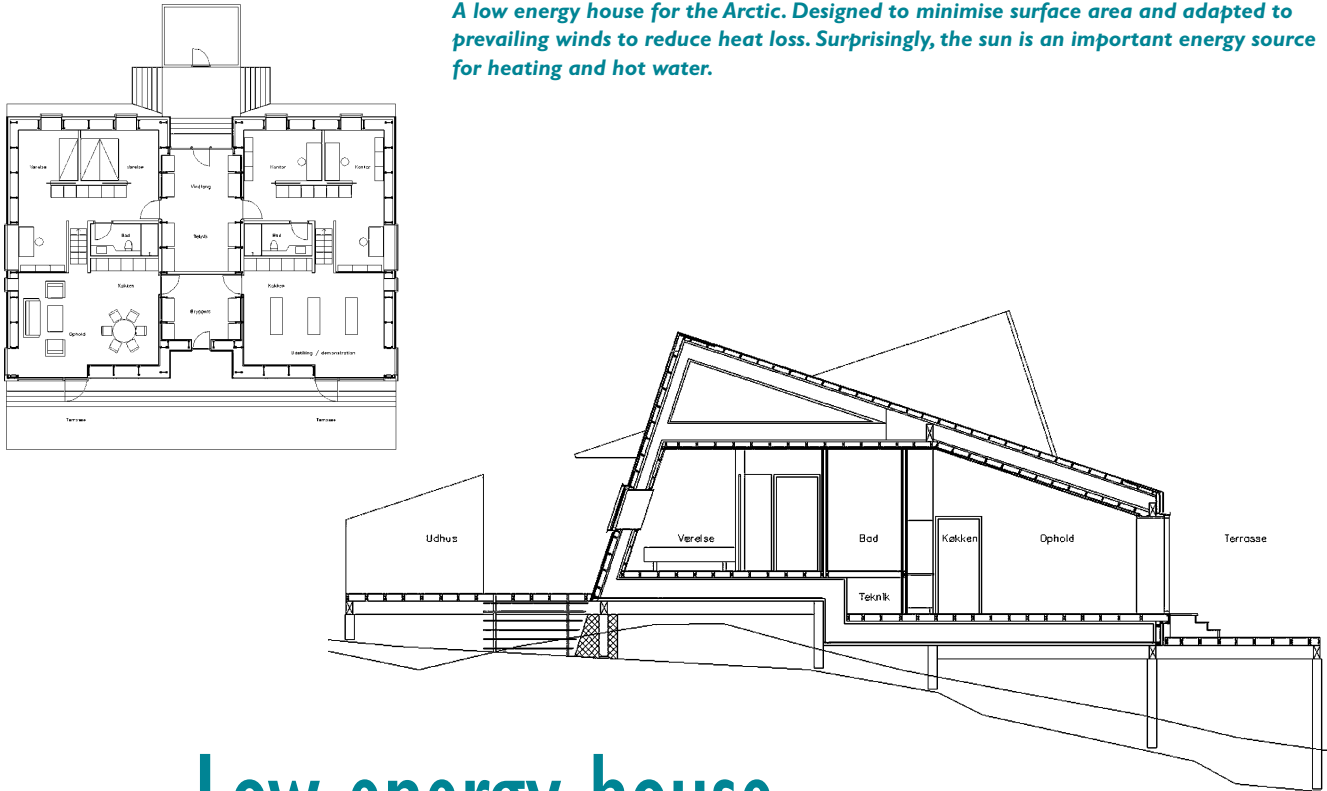
"Historical milestones have the potential to spark exciting new research to engage the next generation of scientists, and to publicly illustrate the benefits and challenges still inherent in polar exploration."

He said it was clear that a complex suite of significant, interrelated, atmospheric, oceanic and terrestrial changes have occurred in the polar regions in recent decades.

"These events are affecting every part of the polar environment and are having repercussions on society," he said. "It is right that they receive this sort of attention."

For further information, see <http://ipy.gsfc.nasa.gov/contact.shtml>  
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*A low energy house for the Arctic. Designed to minimise surface area and adapted to prevailing winds to reduce heat loss. Surprisingly, the sun is an important energy source for heating and hot water.*



## Low energy house

Building an eco-house is a challenge, but building one in the Arctic is the ultimate project. It's one that the Villum Kann Rasmussen fund from Denmark is happy to back.

The fund, started by the founder of the Danish window-firm Velux, has donated 5.5 million Danish Kroner (736,000 US dollars) to the Danish Technological University's Centre for Arctic Technology, to develop a 200-square meter low energy house in Sisimiut, West Greenland.

The theory is that if you can build a house adapted to arctic climate, then you can learn useful lessons for buildings in more

temperate climates.

The site for the house in Sisimiut is a gift from the local authorities and the house is due to be completed in the autumn of 2003. The aim is to halve the heating demand compared to Greenland's new heating regulations, due to be published shortly (and expected to be around 160 kWh/m<sup>2</sup>/year).

The project sets out to demonstrate the use of energy efficient solutions in building design and answer key questions: Is it possible to minimise the surface area of the house to reduce heat loss? Is it possible to adapt the house to the landscape in such a way that it is not exposed to the prevailing wind,

while at the same time keep it exposed to the sun as far as possible? Is it possible to keep different parts of the house at different temperatures depending on use?

The house will use well-insulated exterior walls and a ventilation system with a highly efficient heat recovery unit. It will be covered with roofing felt, similar to traditional peat roofs.

One characteristic will be the seven square meter solar heating system for domestic hot water supply for kitchen and bathroom. The system is big enough to meet hot water needs in summertime.

It's a surprise to many people that the solar power potential in Sisimiut is as high as Copenhagen for example. But most houses in Greenland have heating demands even in the summertime, which can be covered by solar heating systems. Solar heating systems indeed, could be more profitable in Greenland than other, warmer parts of the world.

### What about wind?

■ Wind can be an answer to energy needs but is not ideal in the Arctic where efforts are focussing on reducing energy needs.

Wind turbines are used almost exclusively with prevailing westerly winds in lower latitudes. In the Arctic heavy winds in winter make it difficult to use them.

Another factor is the great varia-

tion in the wind in Greenland caused by fjords and mountains, which makes it very difficult to calculate where a wind turbine should be located.

Construction is also expensive in the Arctic. And it's difficult to get a wind-powered system to act in tandem with the rest of the electricity supply system in a very small society, with limited infrastructure.

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# Greenland campaign launches

Greenlanders watching television on a Sunday night at the end of February got their first taste of a year-long campaign to promote the sustainable use of living natural resources.

The hour-long prime time tv programme on Sunday 23rd February was followed by radio debates the next morning.

Funded by the Home Rule, the Government of Denmark and private donors, the tv and radio campaign will continue every last Sunday and Monday of the month for a year, focussing on different issues of sustainability.

The campaign will also see posters, pamphlets, ads for national and local newspapers and magazines, and popular versions of scientific reports produced, and debates in every municipality in Greenland.

The goal of the campaign is to create a better dialogue between different groups in Greenland society, to share information and to create a common understanding of what sustainable use of living natural resources really means.

The campaign focuses on what people can do to help ease the pressure on the most sought-after species of birds and sea mammals.

The campaign's logo Tulugaq, the raven, chosen because in Inuit myth, the raven arrived with first light, is seen everywhere in nature and is not afraid to talk about things that are commonly not talked about.

The campaign leader is a Master of Science and PhD Tine Pars, well-known for her TV programmes on a number of social issues and for her outspoken and direct approach to sensitive issues.

ANNE-MARIE BJERG, [a.berg@wwf.dk](mailto:a.berg@wwf.dk)

***Tine Pars is leader of the campaign to promote the sustainable use of living natural resources.***



Photo: Kina Joensen



Kluane National Park, Yukon.

Photo: K. Sommerer

## Yukon Party u-turn on protected areas

After only three months in power, the Yukon Party government in Canada has broken an election promise to complete a network of protected areas.

The Party's recent election platform included a commitment to a long-standing federal, provincial and territorial agreement dating from 1992 to protect and conserve examples of all of the territory's natural regions.

"This regressive decision is a huge embarrassment to the Yukon – we are now the only jurisdiction in Canada to cancel work on protected areas," said Juri Peepre,

Executive Director of the Yukon Chapter, Canadian Parks and Wilderness Society (CPAWS).

"By reneging on their election promise to honour Yukon's conservation commitments, the Yukon government has introduced a new era of prolonged uncertainty for both resource and wilderness tourism industries. Suspending work on protected areas will escalate land use conflicts throughout the territory and will make investment in development projects a risky business," added Peepre.

CPAWS-Yukon says that independent research throughout

North America demonstrates protected areas are a foundation to the growth, diversity and stability of economies, as well as supporting the long-term well-being of communities.

"Premier Fentie is mistaken if he believes this knee-jerk move back to the 1950s will help the Yukon economy. Stopping work on conservation and environmental protection will not stimulate anything other than pitting Yukoners against each other," Peepre noted.

Pete Ewins, director of WWF-Canada's Arctic Programme, said: "I am optimistic that the new Yukon government will, on reflection, understand that protected areas are fundamentally linked to sustainable economic development."

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# Climate cost for Canadian Arctic

Arctic Canada is set to bear an unfair burden of the economic impacts of climate change unless plans, which will see Canada try to reduce greenhouse gas emissions by six per cent below 1990 levels by 2008–12, are changed.

Canada released initial implementation plans following its ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change in December.

The plan has several key principles, including a commitment not to put the Canadian economy at risk, and to ensure that no region in Canada will bear an unfair burden to meet the emission target.

But Aynsle Ogden, co-ordinator for the Northern Climate Exchange, said: "Northern regions are projected to experience the greatest and the swiftest impacts of climate change. Already, local observations and scientific monitoring in the North show that significant changes are taking place.

"It could be argued that the Canadian North – characterized by sparse research and monitoring, emerging governments, remote communities and a smaller tax base – will experience an unfair burden

with respect to coping with the impacts of climate change. This regional disparity has not been substantially addressed within the Canadian plan.

"The definition of 'unfair burden' in the Canadian plan is limited in its scope. Unfair burden in the Canadian plan deals only with the economic implications of implementing measures to reduce greenhouse gas emissions – it does not explicitly consider the economic implications of impacts of climate change, and the costs to adapt to a changing environment."

However, Ogden acknowledges, Northern Canada will benefit from the Canadian plan. The plan includes the establishment of a domestic emissions trading system, a partnership fund to cost-share actions to reduce emissions, strategic infrastructure investments, an innovation strategy, and targeted measures including information, incentives, regulations and tax measures.

There will be new opportunities for projects in the areas of energy efficiency, renewable energies, research and education. These programs may create new opportunities for international cooperation between Canada and circumpolar regions.

The Northern Climate Exchange is a public education and outreach organisation, which helps northern Canadians adapt to the realities of climate change.

Canada's Environment Minister David Anderson said: "Ratifying the Kyoto Protocol is the right thing to do for Canadians, for the global environment and for future generations. The scientific consensus demanded action, and the Government of Canada listened and worked with all sectors and segments of the population to develop a Climate Change Plan for Canada that will get results."

For Canadians, ratification signifies that the debate over whether or not current climate change is human-induced is over. A new era, that emphasizes finding ways to slow the rate and magnitude of climate change and adapt to the impacts, has begun.

Canada's ratification is not enough to allow the Protocol to enter into force internationally. Unless the United States changes its current policy of non-participation in this international agreement, Russian ratification is required for the convention to enter into force.

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## Smart move

The SMART project, which sets out to help the arctic tourism sector adopt economically, environmentally and culturally sustainable tourism practices, has received funding from the Northern Periphery Program.

SMART, which stands for Sustainable Model for Arctic Regional Tourism, is an official project of the Arctic Council's Sustainable Development Working Group and the Northern Forum. The funding runs over three years.

The project focuses on training and capacity building so that businesses and communities know what sustainable tourism is and how to get involved. It also promotes market incentives to support the implementation of sustainable practices in the tourism sector.



Photo: Lapplandskulturi

SMART evolved in 2002 when arctic tourism stakeholders gathered in Finland to discuss and develop a project that would accelerate sustainable development in arctic tourism. SMART "crowns" a process that WWF, together with the State of Alaska and the Alaska Wilderness and Recreation Tourism Association, has put substantial effort

into over the past three years.

In April, current project partners and other interested organisations will meet in Rovaniemi, Finland, to develop further plans to implement the project. For further details contact Anu Pruikkonen, [anu.pruikkonen@tokem.fi](mailto:anu.pruikkonen@tokem.fi)

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# Climate change in the Arctic

**Chair of the Arctic Climate Impact Assessment (ACIA) Bob Correll speaks to Samantha Smith, director of WWF's Arctic Programme, about ACIA. The Assessment is designed to evaluate and synthesize knowledge on climate variability, climate change, and increased ultraviolet (UV) radiation and their consequences across the entire arctic region.**

**ACIA's goal is to provide useful and reliable information to the governments, organisations, and resident communities of the Arctic to create the basis for more informed policy options to address such changes. ACIA was initiated in 2000 by the Ministers and Permanent Representations of the Arctic Council and will be completed in the fall of 2004.**

■ ■ *The IPCC Third Assessment Report provides evidence for changes in the climate system on both global and regional scales since the pre-industrial era. In the Arctic, changes in snow cover, ice extent and precipitation are consistent with the*

*observed warming trend of 5°C during the 20th century. What are some of the consequences of changes in these indicators for habitats, species and communities across the Arctic?*

The ACIA is well along, but it is too early in the assessment process to provide comprehensive analyses of the consequences of climate variability and change. However, there are substantial indications of the consequences of climate variability and change evolving in the literature that provides the basis of the assessment. For example, there is increasing evidence that indicates that the more southerly distributions of a number of sub-arctic plant and animal species are likely to extend their ranges northwards, displacing or augmenting many existing arctic species.

Studies indicate the likely magnitude of such range displacements to be from hundreds of kilometers to 1000 km. Further, some studies suggest that such range displacements are already evident, particularly during the last 30 to 50 years, the most evident period of anthropogenic influence on climate change documented by the IPCC.

In some arctic regions more southern species of birds, fish, and other animal (such as beaver, red deer, moose in northern

Scandinavia) are being documented in scientific studies and seen for the first time in living memory by northern residents, and local species are showing both shifts in their local abundance and distribution. The consequence for indigenous and other residents of

the high Arctic are likely to be substantial.

**There are substantial indications of the consequences of climate variability and change.**

■ ■ *There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.*

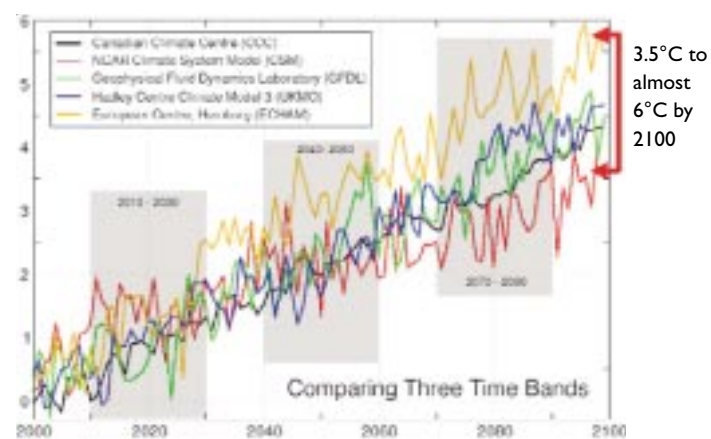
*Some of the impacts associated with anthropogenic climate change may be slow to become apparent, and some could be irreversible. What has the ACIA revealed about inertia and time scales associated with changes in climate?*

Scenarios of future changes suggest that mean annual temperatures could continue to increase in the Arctic by 2° to 5° C and that UV-B radiation, which when combined with climate change has increased impact implications, in spring could increase by 20–90 percent in April in much of the Arctic by 2010–2020. Further, initial results for climate model estimates of potential changes in climate over the decades ahead will be substantial. For example, the figure opposite presents the results from five IPCC models (these simulations



## Arctic surface air temperature

60°N – Pole: Change from 1990–1999 average (°C)



resolve the Arctic most adequately compared to other models currently being used by the IPCC) which estimate the potential changes in surface temperatures over the entire arctic region. It highlights the three critical time-periods being analyzed in the ACIA and indicates substantial temperature increases over the decades ahead, based on a middle-range IPCC B2 scenario.

These studies suggest both the inertia and time scales of projected climate change over the decades ahead.

■ ■ *Two of the most pressing environmental issues in the Arctic are the effects of climate change and toxic contamination. The latest AMAP report on Arctic Pollution 2002 summarises the current knowledge on contaminant pathways and how they relate to climate change. How will ACIA address the effects of long-term climate change in the Arctic, especially with regard to the interactions between climate change and toxic pollution?*

The ACIA has scheduled discussions on these issues for meetings this month, at which time the integration of the AMAP results and the ACIA assessment will be discussed. The AMAP report released in late 2002 suggests that long-term climate variability and change is

likely to affect the transport of contaminants to and within the Arctic. Some pathways changes influenced by climate lead to more efficient transport, one example is the increased transport of airborne pollutants from eastern North America and Eurasia, and another is Atlantic waters carrying more radionuclides from European processing plants.

The 2002 AMAP report further suggests that the reduction of sea ice cover over the arctic oceanic basin is likely to lead to the release of mercury and some of the persistent organic pollutants

currently trapped in the ice. The AMAP reports concludes: "In the long run, anthropogenic emissions that affect the climate may become as important as the emissions of the contaminants themselves in determining the extent to which these contaminants reach and affect the Arctic."

■ ■ *You have returned recently from meetings with indigenous peoples where you discussed the impacts of climate change. What are these impacts likely to be?*

These discussions have been very helpful to the ACIA in its efforts to continue to assess the observed changes in the high Arctic, particularly from the perspective of the indigenous residents. The insights of the Gwich'in and Athabaskan Elders consistently follow those of others, such as Helen Atkinson, of Chisasibi as published in *Voices from the Bay* where she said: "We cannot make predictions anymore. We don't know if the water is going to freeze or not. We used to know what was going to happen at certain seasons but, with all the changes in the climate and the different qualities of water, we can't make those predictions anymore."

Whether in Fenno-Scandia, Northern Russia, the Canadian Arctic or Alaska, the indigenous residents' local knowledge is the same: the climate has been changing in recent decades and changing rapidly.

### The evidence of marked climate variability and change across the Arctic is substantial:

- (i) Most inland arctic areas have warmed in winter by 2°C per decade during the last 30 years, while more coastal regions have shown less severe warming and some records, particularly in the Greenland/Davis Strait area, have even shown cooling.
- (ii) Precipitation has increased in some areas at high latitudes by up to 15 per cent over the last 100 years. Most of this increase has occurred during winters within the last 40 years.
- (iii) Indigenous residents of northern Alaskan villages have reported thawing of previously frozen ground. These observations are confirmed by numerous measurements in Alaska and other parts of the Arctic.
- (iv) Variations in the geographic ranges of animals (beaver, red deer, moose, etc.) have been documented in scientific articles and observed by Native communities in the last several decades.
- (v) Streamflow discharge of major Siberian rivers into the Arctic Ocean has increased in recent years and is associated with a warmer climate and enhanced precipitation in the river basins.



# Ships of old help map global warming

**The logbooks of long-dead explorers and whalers have helped make a 500-year record of arctic sea ice. The resulting charts are also one of the longest records of climate change observations in the world, and will help scientists study global warming.**



Charts shows extent of sea ice based on information from old logbooks.

On 10 May 1553, Sir Hugh Willoughby, an Englishman with no nautical experience whatsoever, set sail from London to find a northeast sea route to China through the Arctic. The expedition was the first of the delightfully named *Mystery and Company of Merchant Adventurers for the Discovery of Regions, Dominions, Islands, and Places Unknown* to find new trade routes with the rich Orient. It was also the last. Although second-in-command Richard Chancellor survived to establish new trade deals with Russia, Willoughby's ship became trapped in sea ice near Murmansk. He and his crew perished.

This ill-fated expedition is just one of many tragic tales from the early exploration of the Arctic and the hunt for the equally prized Northwest Passage. But the explorers' tales of sea ice and storms provide more than just good adventure stories. The logbooks from these expeditions also provide some of the oldest records of climate observations in existence.

For the past 15 years, scientists from the Norwegian Polar Institute and the Norwegian Meteorological Institute have been making historical maps of Arctic sea ice over the last 500 years. The result is over 6,000 charts which, with the help of WWF, have recently

been published on CD-ROM (see news story in Arctic Bulletin 4.02). The charts show the extent of sea ice from 1553 to 2002 in the Nordic seas, extending from Greenland in the west to the island of Novaya Zemlya in the east and covering the whole of the Barents Sea.

The earliest records used for the charts come from the logbooks of explorers and whalers, who, amongst other things, meticulously recorded the condition of sea ice they saw. Willoughby and Chancellor's records are the first of these.

By the end of the 19th century, the first scientific publications on sea ice started to emerge. In 1893, the great Norwegian explorer Fridtjof Nansen set out to prove the existence of the Transpolar Drift Stream, a strong ocean current that moves ice across the North Pole away from the Siberian coast and through Fram Strait between Greenland and the Svalbard archipelago. His ship, the *Fram*, was the first vessel built to survive pack ice without being crushed. Nansen used the *Fram* as a drifting research station as he monitored not only sea ice, but also water depth, temperature, salinity, and ocean currents.

With the discovery of coal on Spitsbergen at the start of the 20th century, the need for information on

sea ice conditions became vital for securing transport routes. This marks the beginning of the systematic collection of sea information in the Arctic. Today satellite images do the work of the sailors of old.

"The sea ice charts we have developed are unique," says Chad Dick, a researcher at the Norwegian Polar Institute. "The record starts with observations made by Arctic explorers and is completed five centuries later with observations made by satellite. There is nothing else like it in existence. It provides an invaluable resource for scientists investigating climate variability and changes in northwest Europe and the Arctic."

So why is sea ice important for climate scientists? One reason is that it is an extremely useful indicator of climate change. The amount of sea ice is affected by both air and ocean temperatures, and scientists believe that changes in the extent of sea ice reflect global climate changes. As sea ice is easily observed, ship logbooks provide an accurate long-term record



Photos: Norwegian Polar Institute

***Maud, Roald Amundsen's North-Eastern Expedition 1919–23.***

***(Inset) Fram, Northern Canada, Otto Sverdrup's 2nd Norwegian Arctic expedition 1898–1902.***

of sea ice extent, and hence climate.

“The extent of ice in the part of the Arctic covered by these new charts has decreased by about 33 per cent over the past 135 years,” says Lynn Rosentrater, a climate change scientist at WWF. “We believe this is due to global warming caused by burning fossil fuels. With the new data available in the sea ice charts, we can more easily study climate variability over a longer period of time and confirm our hypothesis.”

But sea ice is more than just an indicator of climate change – it also directly affects the world's climate. Sea ice in the Arctic is critically important to global climate as it helps regulate ocean circulation. Cold dense water sinking in the Arctic and North Atlantic forms a vital part of the global ocean ‘conveyor belt’ that brings warm water across the

Atlantic in the Gulf Stream, keeping northern Europe 5–10°C warmer than it would otherwise be. This means that influences on the historical climate of northern Europe can also be examined by looking at sea ice extent.

Sea ice is also important for a number of arctic marine mammals. Many species rely on sea ice for raising their young and hunting prey. For example, ringed seals need stable ice as a base to build their lairs and successfully rear their young. Similarly, sea ice is the platform from which polar bears hunt their prey.

Changes to sea ice conditions can have profound effect on these animals. WWF's *Polar Bears at Risk* report shows that reduced sea ice is already affecting the condition of polar bears in the Hudson Bay, Canada, and

concludes that global warming is the number one long-term threat to the survival of these animals.

The new data provided in the archive charts will help scientists assess the current retreat of sea ice in the light of variations over the last 500 years. This will help them to develop new climate models and also to identify the impacts of climate change in the Arctic.

“It's strange to think that the dusty, leather-bound logbooks of long-dead arctic seafarers, which have been sitting in museums and collections around the world for centuries, are now shedding light on something as complex as climate change,” says Chad Dick. “I wonder what they would make of this if they were alive today?”

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Ice-breaker Oden.

Photo: John Jonsson

# Swedish expedition wants international co-operation

The Swedish Polar Research Secretariat is inviting international scientists to take part in a research expedition across the Arctic Ocean from Scandinavia to the Bering Strait, Chukotka, Alaska, Kamchatka – and back.

Discussions have already started between Sweden, Russia and the USA.

Magnus Tannerfeldt, scientific co-ordinator, Swedish Polar Research Secretariat, said: "We want this venture to be international. It will be essential to develop collaborative arrangements between organisations and scientists operating in this region."

The expedition, now in the planning phase and called *Beringia 2005*, will be large and complex,

with focus both on terrestrial and marine sciences.

The Swedish ice-breaker and research vessel Oden will journey from Scandinavia to Beringia and back in 2005, giving opportunities for marine and atmospheric science projects studying the role of the Arctic Ocean in the global climate system.

This theme includes topics such as water circulation patterns, marine geology and geophysics, atmosphere-ocean interactions and land-shelf-basin interactions.

A second scientific theme is tundra ecology and biocomplexity, with the aim to cover a large geographical area in a single season.

From a logistical point of view the operation will consist of three

major components: ship-borne expeditions across the Arctic Ocean and in the northern Beringia region; semi-permanent field camps in Alaska and Chukotka; and a Kamchatka expedition.

In July and August, the Oden will cruise the Bering Strait region. Simultaneously, another part of the expedition will travel along the eastern coast of Kamchatka, from Petropavlovsk to Anadyr.

Field camps will also be established in Alaska and on the Chukotka Peninsula. The tundra ecosystem will be investigated from



Photo: Katarina Abrahamson





different perspectives such as ecology, evolution, biodiversity, biogeography and migration of species, as well as human dimensions and native cultures.

Most of the terrestrial scientists will travel between study sites onboard the Oden, which serves as a mobile scientific platform and will be equipped with laboratory containers. At each research site, scientists will be flown ashore by helicopter for sampling, observations and measurements over two to three days.

Beringia 2005 is the conclusion of two earlier tundra ecology efforts that were organised by the Swedish Polar Research Secretariat: the Swedish-Russian expedition Tundra Ecology-94 along the Eurosiberian coast, and the Swedish-Canadian expedition Tundra Northwest 1999 across the Canadian Arctic and Nunavut.

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More information can be found at the Beringia 2005 web site:  
<http://www.polar.se/english/expeditions/beringia2005>



# Caribou park protected

The Caribou River Wilderness Park in Northern Manitoba, west of Hudson Bay, Canada, was publicly recognized as a permanent protected area late last year after seven years' negotiations.

The park protects important winter range areas for barren-ground caribou. Forestry, hydropower development, mining, and other development activities are prohibited within its boundaries.

Aboriginal and First Nation traditional use and rights of access in the park are protected.

One hundred and thirty kilometers northwest of Churchill, the 764,000 hectare protected area lies on a gently rolling plain called the Kazan Upland, part of the Northern Transition Forest. Tundra, fen and bog peat cover extensive areas of the park. Stands of spruce and tamarack give way to lichen and dwarf tundra vegetation to the north.

The Park has been held under interim protection since 1995 while further consultation with local communities took place.

Caribou River Wilderness Park is at the heart of the traditional territory of the Sayisi Dene in northern Manitoba. The permanent establish-

ment of the protected area occurred with the consent and support of the community.

Steps in consultation prior to community consent for permanent protection abided by the Memorandum of Understanding (MOU) between the Manitoba government and First Nation grand chiefs in Manitoba.

The MOU arose from a set of conservation principles negotiated during the mid 1990s between WWF-Canada president Monte Hummel and the grand chief of Manitoba Keewatinowi Okimakanak, and the Cree consortium of nations in Manitoba.

Honourable Gary Doer, Premier of Manitoba acknowledged the involvement of the Sayisi Dene at the launch in September: "I want to acknowledge and thank the Sayisi Dene First Nation of Tadoule Lake and the community of Churchill for their interest and support for Caribou River Wilderness Park, and express my appreciation to everyone who participated in consultations," said Doer.

Fjord-land east of the Caribou River Wilderness Park is now also under review for protected status.

GAILE WHELAN ENNS, [gwhelan@web.ca](mailto:gwhelan@web.ca)



# Community-based conserva

**In 1997, WWF and the Nature Conservancy of Alaska (TNC) brought together experts from Russia and Alaska to help identify the most important areas and ecological processes driving the immense productivity and biological diversity of the Bering Sea. The Pribilof Islands stood out strongly in that biodiversity assessment and the islands and their surrounding waters became one of the highest priority areas for conservation action.**

The Pribilofs lie on the Bering Sea shelf and provide rare terrestrial habitat near a variety of marine breeding and feeding habitats.



**Horned Puffin.**

Physical processes at work near the Pribilofs, such as tidal mixing, eddy pumping, upwelling and currents, contribute to high levels of primary and secondary production that support an extraordinary

abundance and diversity of marine life.

The islands and surrounding waters provide breeding and feeding habitat for Steller sea lions, harbor seals, and around 70 percent of the global population of northern fur seals. These pinnipeds are major components of, and keystone species in, the eastern Bering Sea ecosystem and the



Photos supplied by WWF-Canada

**Peter Lekanof and Max Malavansky haul in halibut, St George.**

Pribilof Islands in particular.

The Pribilofs are also critical migrating, breeding and overwintering habitat for around three million marine birds. More than 211 species of seabirds have been observed on the islands, 15 of which are endemic to the region or extremely limited in range. Pribilof sea birds include breeding colonies of red-faced cormorants, common and thick-billed murres, black-legged kittiwakes, and most of the world's red-legged kittiwakes, a Bering Sea endemic. Surrounding waters also support rich populations of crab, halibut, pollock and other fish and important near shore and deeper water habitats.

Unfortunately the Bering Sea is experiencing significant biological declines and ecosystem-wide change, and signs of stress are present throughout the trophic food web. For example, the once lucrative king crab fishery is virtually gone. Herring, a previously dominant fish, has declined in the eastern Bering Sea, creating a shortage of preferred food for top predators and seabirds.

These dramatic changes are being felt acutely on the Pribilof Islands, where the northern fur seal population has declined over the last 30 years to less than 50 percent of its peak level in the 1950s. Likewise, the harbor seal population is down 80 percent in recent decades, and the Steller sea lion population is currently listed as endangered under the US Endangered Species act. Steller sea lion declines have led to significant changes in Bering Sea fisheries management. The Islands' vast seabird populations, including the red legged-kittiwake, thick-billed murre and Steller's eider, have all experienced population fluctuations with overall declining trends since the mid 1970s.

The biological declines impact the Pribilof communities of St Paul (population 532) and St George (population 152) in myriad ways.



**Children at St George.**



# tion in the Pribilof Islands



declines, WWF and TNC have worked closely with both communities to better understand local priorities and values; specific biological traits and features of the islands; and the challenges and opportunities facing the economic development of the islands.

Since the mid 1990s, WWF and TNC staff have been frequent visitors to the Pribilof Islands. WWF's goal has been to listen to the concerns and ideas of all interests on the islands and to bring expertise and lessons learned from other marine communities.

Toward that aim, WWF has convened community meetings and engaged the help of staff at WWF's Florida Keys program who successfully lead a multi-stakeholder effort to establish the Tortugas Reserve in the Florida Keys National Marine Sanctuary. Tony Iarocci, a Florida Keys fisherman, who attended the meeting, reported being skeptical of the process but is now supportive as he has witnessed first-hand how marine protected areas can quickly increase fish and other marine resource populations. "Marine protected areas are like money in the bank," he said.

WWF's most recent community meeting in November 2002 was jointly sponsored by the tribal governments of St George and St Paul and sought to begin a broader dialogue about the resource declines

## Fur seal.

Fisherman Peter Lekanof says: "We have to travel further and further to harvest halibut and other fish. I've got two daughters and a son to support. I've got to start thinking about their future on this island." Dustin Jones, a hunter on St Paul says: "I'm afraid my children won't be able to harvest fur seals like I do." Others worry that the Pribilofs' small but budding nature-based tourism industry will also collapse if the bird and marine mammal populations continue to decline at precipitous rates.

Responding to the Pribilovians' concerns about the resource





➤ and their effects on the Pribilofs.

The workshop brought together a wide range of interested parties – fishing industry representatives, federal and state agency staff, local fishermen, community leaders, scientists and conservationists – to discuss the status and future of marine conservation and resource management around the Pribilofs.

It also included discussions on the status and trends of the region's fisheries and wildlife, history and evaluation of the Pribilof Islands Habitat Conservation Area, availability of relevant socio-economic information, and options for restoring depleted populations.

As a result of the November workshop, participants decided to continue the conversation in a more formal setting, by initiating the Pribilof Islands Ecosystem Stakeholder Process.

An organizing committee is currently planning the process, which will develop a consensus-based approach to addressing fisheries, fur seal and other biological resource management concerns. Participants committed to including key decision makers in the stakeholder process, and to making the process broadly inclusive, balanced and fair.

Recommendations from the stakeholder group will be taken to the North Pacific Fisheries Management Council, National Marine Fisheries Service, and other policy-setting and management bodies. The Pribilof Islands Ecosystem Stakeholder Process is due to start in spring 2003.

Evie Witten, director of the WWF-US Alaska Field Office, said: "Given the high degree of energy and participation at the November workshop, the growing trust between stakeholders, and the identification of shared concerns, we are very optimistic about the prospects of building a collaborative approach for improving sustainability in the Pribilof Islands ecosystem. Sustainability that will ensure the Pribilofs northern fur seal rookeries are populated at historic mean."

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For more information on WWF Bering Sea work visit [www.worldwildlife.org](http://www.worldwildlife.org)

## What hope for the Barents?

Time is running out. The Norwegian Government is now under pressure to make the Norwegian side of the Barents Sea one of the best managed ecosystems in the world. The alternative is to give in to pressure from the oil and gas industry and allow oil and gas exploration in the Barents by as early as this year.

The Norwegian Government recognised its responsibility to protect this valuable and vulnerable ecosystem for future generations in 2002 when it decided to develop an integrated management plan based on an ecosystem approach.

Ecosystem-based management of the marine environment means management which takes account of the basic conditions set by the ecosystem in order to maintain production and conserve biological diversity. The plan will take into account the overall environmental impacts of activities such as fishing,

aquaculture, oil operations and shipping in order to ensure that the cumulative effect on the environment in the long term is not greater than the ecosystem can tolerate.

WWF and other NGOs endorsed the Government's commitment. If carried out, the integrated management plan for the Barents Sea would indeed set new standards for the management of large marine ecosystems. So what's going wrong?

The integrated management plan is receiving heavy criticism from the oil and gas industry. The oil lobby claim that they cannot afford to wait the three years it will take to fill the most obvious knowledge gaps and prepare an integrated



## Nuclear threat in the Baren

One of the Arctic's most sensitive ecoregions lies beside one of the world's greatest potential nuclear threats to security and environment.

The Kola Peninsula is home to the world's highest density of nuclear reactors and weapons, radioactive waste, and spent nuclear fuel.

Nearby, the Barents Sea is one of the most biologically rich regions of the north and hosts numerous coral reefs, seabirds, benthic species, and the only polar bear population not impacted by hunting.

Against this background, delegates to a high-level meeting on environment and security in the Barents region agreed environmental threats and arms control are complementary. The meeting, co-sponsored by the Norwegian Institute of International Affairs and WWF, took place in Oslo in December

Ambassadors, policy-makers,

scientists and NGOs recommended that the international community, and Norway in particular, address key concerns in the Kola region including securing and storing spent fuel, decommissioning non-strategic submarines and increasing accountability and control of tactical nuclear weapons.

The seminar participants also made recommendations in three other areas: develop training programs oriented towards security; assemble a task force to make the G8 initiative operational; and increase political and public awareness of the dangers of the Kola peninsula legacy.

Interest in environment and security has increased greatly in the period since the 9/11 attacks in the USA.

In June 2002, the G8 countries pledged to support a "Global Partnership Against the Spread of Weapons and Materials of Mass Destruction" with up to 20 billion USD.



Photo: Peter Prokoshch

### Norway's Nordkapp.

management plan. They claim jobs will be lost and investments will be made elsewhere. The politicians seem to be listening and rumours of fast-tracking the process abound.

As a result, proposals for an integrated management plan based on an ecosystem approach are in danger of turning into a series of sectoral impact assessments that fail to consider the overall impacts on

the ecosystem. If that happens Norway will lose a unique opportunity to make the Norwegian side of the Barents Sea the best managed marine ecosystem in the world.

The future for the Barents remains in the balance. By the autumn its fate will be decided.

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■ **THE BARENTS SEA**, between Russia and Norway, represents one of Europe's last large, clean and relatively undisturbed marine ecosystems.

With the notable exception of intensive commercial fisheries, the Barents Sea is exposed to human activities to a relatively small extent.

Due to its shallow waters and mixing of nutrient rich ocean currents the Barents Sea is one of the world's most productive oceans.

High primary productivity supports abundant populations of fish, sea birds, benthic communities and marine mammals. Many of the stocks merit international protection.

The main characteristics of the ecosystems in the Barents Sea are known, but there are still important gaps in scientists' knowledge about the distribution and ecology of many species and communities.

Andreas Tveteraas, head of conservation for WWF-Norway, said: "We also know very little about how pollutants affect species and systems. Low temperatures and drift ice mean a lengthy degradation period for oil and chemicals discharged into the environment and considerably reduce the scope for effective systems to deal with acute pollution."

## ts region

Among the priorities is to dismantle decommissioned nuclear submarines, particularly on the Kola Peninsula. This task also remains on the priority list of US Senator Richard Lugar, a proponent of nuclear non-proliferation and head of the US Senate Foreign Relations Committee.

Spent fuel is considered to be the foremost issue in the region. Spent fuel can contain significant quantities of highly enriched uranium and plutonium, depending on the initial core loads and burn-up. Spent fuel rods can be a sought-after ingredient in so-called "dirty bombs". The total amount of waste and spent fuel being stored on Russian naval bases is largely unknown; however, there should be particular focus given to the two storage sites at the Andreeva Bay and Gremikha naval base.

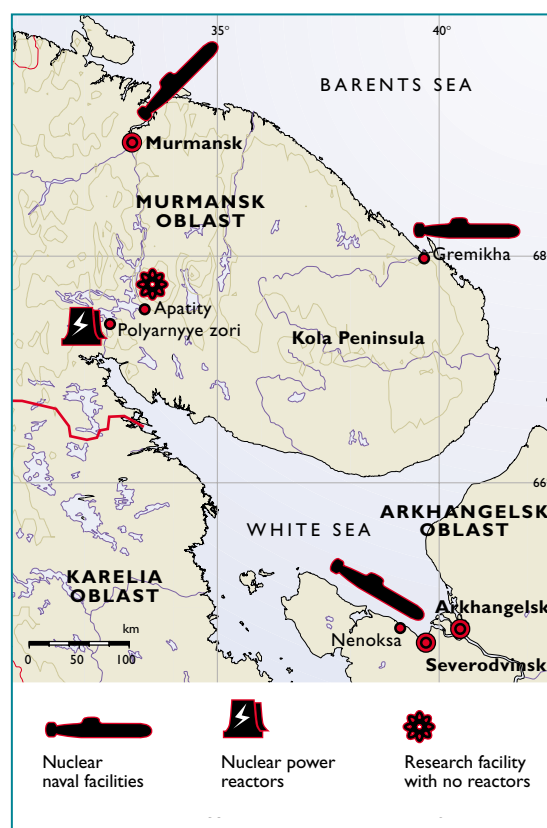
Around 90 decommissioned submarines await dismantlement.

The average cost to dismantle each nuclear submarine is about six million USD, excluding transportation and logistical costs.

US legislation does not allow for dismantlement of submarines lying in Russia's Northern Fleet harbours, although there are dismantlement capacities at Russian shipyards. Funds should be made available for dismantlement, and steps should be taken to prevent decommissioned submarines from sinking.

Tactical nuclear weapons remain outside any formal arms-control agreements. There is a high level of uncertainty when it comes to quantities, location and security of Russian tactical nuclear weapons. The international community should consolidate Russia's nuclear weapons stockpile; increase transparency of tactical nuclear weapons; and accelerate the destruction of tactical nuclear weapons slated for elimination.

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# Victory – but the battle is not over

In March conservationists won a stunning victory in the U.S. Senate. On the eve of war with Iraq and with gasoline at its highest prices ever, a majority of senators rejected a proposal to open the Arctic National Wildlife Refuge to oil development. Drilling proponents argued oil from the refuge would reduce the nation's dependency on foreign oil and improve national security. Senators that support conservation of this internationally important reserve as well as a rationale energy policy debunked the claims of development proponents and blocked their back door maneuver to open the refuge through the budget process.

The debate over drilling in the Arctic refuge has come up periodically since the Reagan Administration first recommended development in 1987. Each time the proposal has been rejected, including another bipartisan vote against drilling in the Senate less than one year ago. But even these most recent setbacks have not deterred drilling proponents. WWF expects there will be other attempts

to open the refuge in legislation that is considered by Congress this year.

The Arctic National Wildlife Refuge is located in remote Northeast Alaska and is approximately 19 million acres in size, an area about the size of Ireland. The portion of the reserve threatened by oil development is a 100-mile long stretch of the Arctic Coastal Plain – what government biologists refer to as the “biological heart” of the refuge. The refuge is the only part of Alaska's northern coastal region, the so-called North Slope, where Congress specifically prohibits petroleum development.

The Arctic refuge is unique in North America. The reserve protects the full spectrum of sub-arctic and arctic plants and animals. Near its southern boundary, taiga forest gives way to the magnificent high peaks of the Brooks Mountain Range. The range and its foothills form a picturesque backdrop for a narrow strip of tundra plain that extends north to the Arctic Ocean. The plain is a critical calving ground, insect relief and summer feeding area for the 129,000-animal

Porcupine caribou herd, named after the ice-choked Porcupine River the animals must cross in migrating from their wintering area in Canada's Yukon Territory. The refuge also provides habitat for many other species such as polar bears, grizzly bears, wolves, wolverines, musk oxen, arctic fox, Dall sheep and 160 species of birds. Alaska's Arctic Coastal Plain is a region of such high biological significance that scientists at World Wildlife Fund included it among the Global 200 Ecoregions – the most critical ecoregions for biodiversity conservation in the world.

Based on seismic exploration in the 1980s, the U.S. Geological Survey estimates the mean economically recoverable oil under the wildlife refuge is 3.2 billion barrels. To put this amount in perspective, Americans consume this much oil every six months. If there is any recoverable oil in the refuge, the government predicts it will take approximately 10 years before it would be available to consumers and it would never amount to more than two percent

**CARIBOU REFUGE:** The cool temperatures on a snow field provide much-needed relief from mosquito swarms in summer.



Photo: Ken Madsen/WWF US



of the nation's oil supply.

In contrast to the administration's claim that drilling would require only a 'small footprint,' conservationists believe oil exploration and production in the fragile tundra wetlands of the refuge would destroy the area's wilderness values as well as damage wildlife habitat and displace wildlife species. Government biologists predict that caribou, polar bears, and musk oxen would be most impacted by the network of roads, pipelines, and drilling pads and the noise from traffic, aircraft, and hundreds of oilfield workers. Gravel mining for roads and drilling pads and siphoning huge volumes of water from rivers and streams used to produce oil from wells will have a negative effect on fish and other wildlife.

Public opinion polls consistently show a majority of Americans oppose drilling in the Arctic refuge. The surveys also find that people feel strongly that the U.S. should address U.S. energy needs by increasing automobile fuel efficiency and developing renewable energy sources such as wind, solar, and geothermal power. A careful energy approach would not only spare the Arctic refuge and other public lands from development, it would address other pressing concerns such as climate change.

Although drilling proponents lost the vote in the Senate in March, we believe they will try to attach a drilling proposal to other relevant legislation pending in Congress. Conservationists and our allies in religious and Native American organizations and labor unions will continue to work with a bipartisan group of supporters in Congress to defeat these efforts.

Even as this debate unfolds, organizations and individuals that are united in defending the Arctic National Wildlife Refuge are working together to protect the refuge as part of the National Wilderness Preservation System. In this way, the unique biodiversity of this arctic wilderness can remain a legacy for all Americans, rather than being sacrificed for the lack of a better answer to our nation's dependency on oil.

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Photo: Norwegian Seafood Export Council - Per Eide

Cod-farming: the future?

## The future of cod hangs in the balance

**The North Atlantic cod (*gadus morhua*) has for centuries been a symbol of the strong and independent fisherman. Cod still provides an important livelihood for many coastal communities in the Arctic. However, a future for cod fishing is not guaranteed. Careful management needs to take place if arctic cod stocks are to avoid the fate of Canada's Newfoundland cod stocks, which vanished in the mid-1990s. One controversial solution is cod farming.**

After many years of uncertainty, researchers in Norway are now confident that there are two distinct types of cod: coastal cod and migratory cod, or oceanic cod. Coastal cod spawn and dwell in coastal waters. The assumption is that the

different stocks of coastal cod are peculiar to a locality.

Spring cod, Lofoten cod, Norwegian Arctic cod or Barents Sea cod are all different names for the oceanic cod stock living in the Barents Sea and spawning in the Lofoten area in northern Norway. Researchers from the International Council for the Exploration of the Seas (ICES) warn that these stocks are outside biologically safe limits, and that for the first time spawning stocks are becoming younger and younger.

As a result, ICES has, over the past years, recommended that fishing of both the Barents Sea cod stock and coastal cod stocks should be significantly reduced. Unfortunately, fisheries management ignores the advice from researchers. Stocks are therefore expected to decline.

As wild cod stocks are heavily overfished, the interest in growing ➤



Fish farm in the Faeroes Islands.

Photo: WWF-Carsten Maren ESMARK

- farmed cod is growing. Optimistic predictions estimate that cod farming in Norway alone will produce between 175,000 and 225,000 tonnes of fish in 2010. This is seven times what the Norwegian Lofoten fishery currently produces annually.

Maren Esmark, marine conservation officer for WWF-Norway, says: "Cod farming is a new industry and little is known about potential environmental effects. We know for sure that problems associated with discharge of nutrients and chemicals will increase if the aquaculture industry in the Arctic continues to grow. What we don't know is whether or not farming cod can influence already depleting wild cod stocks. Conflicts have already begun as local fishermen argue that fish farms may have a negative effect if they are placed near important spawning areas for local wild cod stocks."

One important difference between farming cod and farming salmon is that cod spawn in salt-water. Indications so far show that farmed cod reach maturity by the age of two years and often spawn in captivity in open net cages in the sea.

Farmed cod are also more likely to escape than salmon. Salmon tend to swim in groups towards the middle of a net cage. Cod on the other hand, swim around the edge of the nets. If a hole presents itself, the cod escape. Salmon often stay nearby the fish farm the first days after escape, while farmed cod are expected to spread out almost at once, making them almost impossible to catch.

Several arctic countries, Canada, USA and Norway, have already experienced the negative impact of

salmon farming on wild stocks of North Atlantic salmon. Sea lice infections from fish farms can be lethal to migrating smolt (young salmon), and important salmon rivers have at times consisted of up to 50 per cent escaped farmed fish. Escaped fish can spread disease and parasites and can also interbreed with their wild counterparts. This loss of genetic diversity is not sustainable in the long-term, and is a great threat to the salmon stocks in the Arctic.

Already, the Norwegian government has given out several hundred licences for cod farming. This has happened without full or even partial understanding of potential environmental impacts of such activities. WWF-Norway is concerned about what could happen to local cod stocks – already depleted by overfishing – if they are impacted by escaped farmed cod interbreeding or diseases.

Rasmus Hansson, Secretary-General CEO of WWF-Norway, says: "WWF-Norway has advocated that important spawning areas for the Barents Sea cod, such as Vestfjorden in the Lofoten area, should be closed to cod farming in the interim until we know more about the environmental effects of cod farming. WWF also promotes the use of local cod stocks for farming, and would like to put a stop to today's use of non-indigenous cod stocks."

"And, as for farmed salmon, we are urging the industry to mark each farmed fish in order to prevent escapes and to investigate possible interactions between wild and domesticated fish."

MAREN ESMARK, WWF-Norway,  
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#### ■ Northern Timberline Forests:

*Environmental and Socio-economic Issues and Concerns*

Edited by KANKAANPÄÄ, S., MÜLLER-WILLE, L., SUSILUOTO, P., and SUTINEN, M-L.

The Finnish Forest Research Institute, 2002 289 pp.

The term "timberline forest" refers to the sensitive forests ecosystems at the northern edge of the tree line.

This book is the companion to the May 2002 Northern Timberline Forests Workshop, a project of the Arctic Council's Sustainable Development Working Group. The volume contains nine papers ranging in theme from human habitation to ecosystem and species information to policy actions in timberline regions. All papers appear in both English and Russian.

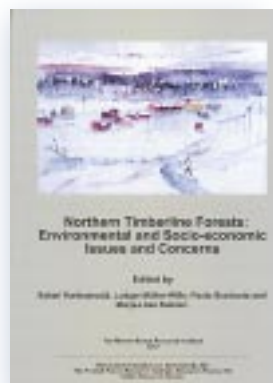
As indicated by the title, the

book focuses strongly on the interaction between northern inhabitants and the forests on which they have historically been dependent. A common theme is the dynamic between traditional use, industrial use, and ecosystem functioning. It is interesting to note that the relationship between the tree line's physical location and humans is

reciprocal; humans have relied on the presence of trees and have settled the land accordingly, but now, through human land use and through global climate change, the location of the tree line is changing.

The upshot of the workshop was a set of recommendations that focused on four key areas. The first was that the relationship between humans and the timberline forest must be enhanced for the good of both humans and environment. The other three addressed the creation of monitoring and research regimes, the need to examine the sustainability of reindeer herding, and ways of maintaining biodiversity in northern timberline forests.

This volume lies on the socio-economic end of the spectrum, rather than on the scientific end. It is a well-presented intersection of policy, culture, and science at the northernmost fringe of our forests.



## Forthcoming arctic meetings & events

### Arctic Council Events

#### Meeting: Arctic Council Sustainable Development Working Group

- WHERE: **Reykjavik, Iceland** • WHEN: **April 7–8**
- CONTACT: Arctic Council SDWG Secretariat 20th Floor, 580 Booth Street, Ottawa, Ontario, Canada, K1A 0E4; Tel: +1-613-995-3760, +1-613-834-3627; Fax: +1-613-834-0572; Email: bfunston.ncc@rogers.com

#### Meeting: Senior Arctic Officials

- WHERE: **Reykjavik, Iceland** • WHEN: **April 9–10**
- CONTACT: The Arctic Council Secretariat, Ministry for Foreign Affairs of Iceland, Raudararstigur 25, IS-150 Reykjavik Iceland; Tel: + 354 545 9900; Fax: + 354 562 2373, E-mail: arctic.council@utn.stjris

#### Meeting: Conservation of Arctic Flora and Fauna (CAFF) Flora Group

- WHERE: **Helsinki, Finland** • WHEN: **April 28–30**
- CONTACT: CAFF International Secretariat, Hafnarstraeti 97 600 Akureyri, Iceland; Tel: +354 462 3350; Fax: +354 462 3390; E-mail: caff@caff.is; Web site: <http://www.caff.is/>

#### Meeting: 17th Arctic Monitoring and Assessment Programme (AMAP) Working Group

- WHERE: **Boulder, USA** • WHEN: **May 12–14**
- CONTACT: AMAP Secretariat, Strømsveien 96, P.O. Box 8100 Dep., N-0032 Oslo, Norway; Tel: +47 22 57 34 00; Fax: +47 22 67 67 06; Web site: <http://www.amap.no/>

### Other Events

#### Conference: Arctic Science Summit Week

- WHERE: **Kiruna, Sweden** • WHEN: **March 31 – April 4**
- CONTACT: Swedish Polar Research Secretariat, P.O. Box 50003, S-104 05 Stockholm, Sweden; Tel: +46 8 673 96 00; Fax: +46 8 15 20 57; E-mail: assw2003@polar.se; Web site: [www.polar.se](http://www.polar.se)

#### Conference: Sustaining the Bering Sea: An International Conference for Collaboration

- WHERE: **Girdwood, Alaska** • WHEN: **April 1–4**
- CONTACT: Pacific Environment, Jennifer Eyres, 1440 Broadway, Suite 306, Oakland, CA 94612, USA; Tel: +1 510-251-8800 ext. 307; Fax: +1 510-251-8838; Email: jeyres@pacificenvironment.org; Web site: [www.pacificenvironment.org](http://www.pacificenvironment.org)

#### Conference: 33rd Annual Arctic Workshop

- WHERE: **Tromsø, Norway** • WHEN: **April 3–5**
- CONTACT: Anne Kibsgaard, Norwegian Polar Institute Polar Environmental Centre N-9296 Tromsø; Tel: +47 77 75 06 16; Fax: +47 77 75 05 01. E-mail: anne.kibsgaard@npolar.no. Web site: <http://www.npolar.no/>

#### Conference: Dynamics Of Socio-Economic Processes In Northern Regions

- WHERE: **Apatity, Russia** • WHEN: **April 9–12**
- CONTACT: The Institute of Economic Problems; E-mail: selin@iep.kolasc.net.ru or ivanova@iep.kolasc.net.ru

#### Conference: Arctic Forum Responding to Global Change: Resilience and Vulnerability in the Arctic Systems

- WHERE: **Arlington, USA** • WHEN: **April 28–29**
- CONTACT: 3535 College Road, Suite 101, Fairbanks, Alaska, 99709-3710, USA; Tel: +1 907 474 1600; Fax: +1 907 474 1604; E-mail: arcus@arcus.org

#### Conference: Assessment And Remediation Of Contaminated Sites In Arctic And Cold Climates (ARCSACC)

- WHERE: **Edmonton, Canada** • WHEN: **May 4–6**
- CONTACT: ARCSACC Conference – Edmonton'03, University of Alberta, Department of Civil and Environmental Engineering, Rm. 303 CEB, Edmonton, Alberta, T6G 2G7, Canada; Tel: +1 780 492 2176; Fax: +1 780 492 8198; E-mail: kwbiggar@civil.ualberta.ca or michael.nahir@pwgsc.gc.ca; Web site: <http://www.civil.ualberta.ca/arcsacc/information.htm>

#### Conference: Second Annual Carbon Sequestration

- WHERE: **Alexandria, U.S.A.** • WHEN: **May 5–8**
- CONTACT: ExchangeMonitor Publications & Forums, P.O. Box 65782, Washington, DC 20035; Tel: +1 877 303 7367 or +1 202 296 2814 ext. 16; Fax: +1 202 296 2805; Web site: <http://www.carbonsq.com>

#### Conference: Earth Cryosphere as a Habitat and an Object for Nature Management

- WHERE: **Pushchino, Russia** • WHEN: **May 19–21**
- CONTACT: David Gilichinsky, 142290 Pushchino, Moscow Region, Institute of Physico-Chemical and Biological Problems in Soil Science, RAS; Tel: + (0967) 732604 Fax: + (0967) 790595; E-mail: gilichin@issp.serpukhov.su

#### Conference: International Conference on Minority Languages

- WHERE: **Sweden, Kiruna** • WHEN: **June 6–7**
- CONTACT: Department of Finnish, Stockholm University SE-106 91, Stockholm, Sweden; E-mail: fguest@finska.su.se; Web site: <http://www.finska.su.se/konf03/konf03.html>

### Meeting and event information on the Web

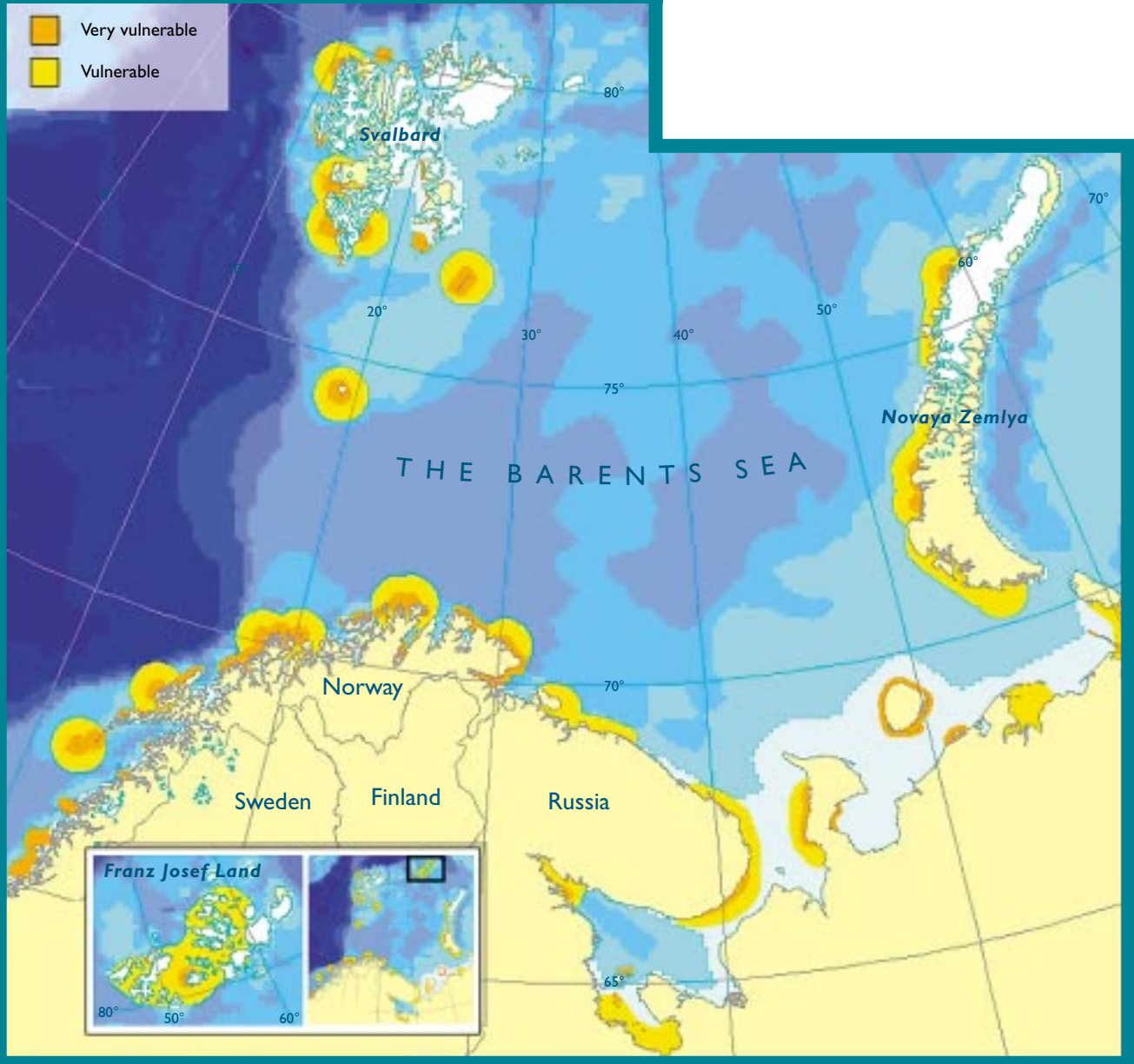
- <http://www.arcus.org/Calendar/upcomingEvents.shtml> • <http://www.iasc.no/SAM/samtext.htm>



## Seabird areas vulnerable to proposed petroleum activity in the Barents Sea

## WWF ARCTIC BULLETIN

PO Box 6784 St Olavs plass, N-0130 Oslo, Norway



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