

ARCTIC FLORA AND FAUNA

Recommendations for Conservation



Foreword

On behalf of the Conservation of Arctic Flora and Fauna (CAFF) Working Group, I am pleased to present the Arctic Council with *Arctic Flora and Fauna: Recommendations for Conservation*. This booklet contains a series of thematic goals and recommendations arising from *Arctic Flora and Fauna: Status and Conservation*, the science-based overview of Arctic biodiversity and key conservation issues published by CAFF in 2001.

Arctic Flora and Fauna: Recommendations for Conservation is a collective product of the Member States, Permanent Participants, and Observers to the CAFF Working Group, assisted by a small editorial team. I want to express my sincere thanks to all involved.

Notwithstanding the generally good condition of Arctic biodiversity, compared to many other regions of the world, the 2001 report made it clear that there are looming regional challenges, which can only be addressed through collaborative actions.

The recommendations presented herein are intended to serve as strategic guidelines for the Arctic Council, its partners and subsidiary bodies, as well as others active in Arctic conservation. Our hope is that these recommendations will inspire more detailed actions among all concerned so that future generations will continue to enjoy the biodiversity and pristine nature of the Arctic.

Sune Sohlberg
Chair of CAFF



Arctic dandelion



Alpine cinquefoil



Icescape in Greenland

Introduction

The Arctic is a diverse array of landscapes, seascapes, plants, animals, and people connected to the rest of the world through currents of air and water, the migrations of animals, and the movements of people and natural resources. Effective conservation in the Arctic links local measures with national and international actions to ensure that the Arctic ecosystem as a whole is protected while also allowing Arctic communities to carry on their ways of life in an environmentally sustainable fashion.

In the context of *Arctic Flora and Fauna: Status and Conservation*, conservation means the preservation of wild plants and animals and the natural processes that sustain them while accommodating sustainable use of these resources and of the environment. Conserving biodiversity,

approach to conservation, acknowledging the ecological processes that support species and landscapes and the social systems that are themselves supported by a healthy environment. The ecosystem approach recognizes that humans, with their cultural diversity, are an integral component of ecosystems. Therefore, lasting conservation depends on a strong commitment to the principles of environmental protection and sustainability, including appropriate human uses.

In the Arctic, this is especially important for the region's indigenous residents. Over millennia, they have forged close connections to the environment, physically, culturally, and spiritually. The people of the Arctic and their ways of life are an important part of the heritage of the North and an integral part of northern landscapes and seascapes. At the same time, human groups are constantly changing. This process has been especially rapid in the Arctic over the past century, as northern societies have become tied more and more closely to the nations of which they are part.

Globalisation and the development of the information society show that the pace of change is not slowing down. For the Arctic, it is essential to recognise that conservation issues must be considered in a global context. Environmentally, global change adds an additional dimension to the social and cultural changes already experienced. Climate change, already in evidence, is perhaps the most significant challenge to the Arctic as a region. The push for sustainable development is one response to the combined effects of these various forms of change. The distinctive physical, ecological, and social features of the Arctic are a vital part of the diversity of life on earth, and need collective efforts to conserve them.

therefore, requires an understanding of the ways in which people use the resources of the Arctic. It also recognizes that both the natural and the human components of the Arctic ecosystem are constantly changing and adapting and that conservation measures must also adapt to these changes. Conservation acknowledges that a healthy environment depends on compatible human uses, for humans are part of every ecosystem in the world.

The Arctic Council advocates an ecosystem



From Hellisheidi, Iceland

The Arctic

Based on the definition of the Arctic accepted by the eight member states of the Arctic Council, the CAFF area covers some 14.8 million square kilometres of land, and over 13 million square kilometres of ocean.

Ecology

The Arctic environment is not uniform and living things in the Arctic face a variety of extremes. For example, in some locations, winter temperatures can drop to -60C or lower. Throughout the Arctic summer, daylight can be continuous for months, whereas in winter the sun stays below the horizon much of the time. The weather is highly variable from day to day and year to year. Ice and snow can cover water and land for more than half the year. Arctic plants and animals must be able to cope with these severe conditions and quickly take advantage of favourable periods. To do so, they have developed unique adaptations. Some insects, for example, have developed biochemical mechanisms to allow them to freeze without damaging their cells while others produce antifreeze compounds. Many birds and some mammals over-winter outside the Arctic. Others build up reserves of fat, grow thick fur or feathers, and adjust their metabolism to minimize energy use. When conditions are good, some insects and small mammals are able to produce several generations in the course of a summer, creating a population boom that helps make up for poor years. Many plants grow close to the ground where snow will protect them from wind and severe cold. The Arctic summer is short, but in early spring, as soon as sunlight reaches the ground and waters, Arctic plants burst into life and call on their stored nutrient reserves.

The diversity of life strategies in the Arctic is one hallmark of the region's overall biodiversity. Although the total number of

FILED IN THE ARCTIC



Mosquito on a mountain avens

species is low compared with temperate and tropical ecosystems phenotypic and genetic diversity within species may be high, and some species such as Arctic char can fill several ecological niches. Population ranges tend to be large, and marginal groups of plants or animals at the edge of their range are seen as sensitive indicators of change including global warming. Habitat diversity tends to be high, even over short distances where microclimates can create dramatic differences. However, the relative paucity of species creates additional vulnerability since disruption of one or two species that play vital ecological roles can have serious impacts on the ecosystem. Conservation efforts must take these characteristics into account, including the ways species interact with one another and depend on their physical environment.

Arctic Flora and Fauna: Status and Conservation classifies the Arctic into four major biomes and notes that the number of plant species in the Arctic decreases as one moves northward, reflecting the increasing severity of the climate:

- The forest-tundra transition zone is bounded by the continuous forest, mainly boreal, to the south and by the treeless tundra to the north.
- The tundra and polar desert encompass the vast treeless area that has continuous low vegetation cover and regions more extreme that have only sporadic vegetation or none at all.
- Arctic freshwater areas include rivers, lakes, and wetlands, which are subject to rapid melts and discharges, typically producing flooding in spring but minimal water flow in late summer .
- The Arctic marine environment includes the central Arctic Ocean with its permanent cover of multi-year ice and the marginal seas, where ice is seasonal and regenerated every year .

Each of these zones has unique habitat features and biodiversity .

Humans

Since at least the last ice age, humans have lived in the Arctic and depended on the resources it can provide. The history of human settlement in the Arctic shows waves of occupation and cultural change in response to environmental shifts, innovations, and resource demands from lower latitudes.

Today, the Arctic is home to two to four million people, depending on the boundary used. Among these are some two dozen distinct indigenous groups, members of which continue to practice traditional ways of life amid modern innovations and influences. Conflicts over land and resources have led to displacement, to the loss of certain traditions, and to the depletion of some populations of wildlife. However , a growing cultural and political awareness among Arctic indigenous peoples has

sparked a revival of many traditional practices and a push for recognition of customary rights to land and resource use.

Humans have left their fingerprint throughout the Arctic including several negative impacts on the environment. Over - use of living resources, pollution associated with industrial development, habitat damage



Chukotka woman

and fragmentation, the introduction of non-native species, and climate change are among the ways humans have harmed or threaten to harm the Arctic environment. Although some impacts are largely localised, more insidious is the cumulative impact of a range of human actions over time and space. The collective impact of habitat destruction, pollution, over - harvesting, and climate change, for example, may be far greater than an examination of any one factor would suggest. A critical part of considering the Arctic as a system is considering the interactions among impacts.

Status and Trends

Quantitative data is available on the status and trends of some Arctic species but is often targeted at economically valuable species or those representing other human-interest values. On the whole, there are far fewer data available than are needed to

make a quantitative assessment of species abundance and trends for the Arctic. The degree to which individual species indicate overall ecosystem health is not clear. Furthermore, as pointed out in *Arctic Flora and Fauna: Status and Conservation*, available quantitative data need to be treated with caution. Species counts are uncertain due to population fluctuations and differences in census and data presentation methods.

The trends in species for which data are available differ. Some species of seabirds, for example, are in decline whereas others are increasing. On land, geese appear to be thriving in much of the Arctic, whereas sandpipers are declining across large regions such as North America. Many marine fish stocks are declining or already at low levels. For land and sea mammals, trends are variable. Clearly, more information is needed to determine and confirm regional patterns and underlying causes of increases and decreases in individual populations.

CAFF in collaboration with AMAP has begun establishing biodiversity monitoring networks for a variety of species groups. The data produced by these networks will provide a more extensive and reliable quantitative basis for future assessments. Further studies are needed to examine the relationships of various trends, to determine the links between them, and to identify the causes of environmental shifts and cycles.

Conservation

Approaches to conservation include establishing protected areas, species management, regulating environmental impacts, and controlling pollution.

In the Arctic, as of 2001, there are 344 protected areas covering approximately 2.45 million square kilometres, or 17.5%



Walrus colony

of the land area of the Arctic as defined by CAFF. These special areas are a core component of the conservation regime of all Arctic countries and often include provisions for traditional hunting, fishing, trapping, and gathering. Protected area coverage, however, is distributed unevenly across countries and biogeographic zones. The Circumpolar Protected Areas Network (CPAN) is being developed to support and promote protected areas and conserve key habitat throughout the Arctic and to adequately represent all biogeographic zones.

Species management through regulating fishing, hunting, and gathering is another important form of conservation and one of the oldest. By the middle of the 20th century, governmental hunting regulations, including harvest limits and seasonal restrictions, had been introduced across much of the Arctic. One of the most notable recent innovations is the involvement of hunters and fishers in wildlife management. However, the existence of regulations is no guarantee of sound conservation. Many species were seriously depleted in the 20th century, especially in commercial fisheries. In addition, bycatch of birds and non-target fish and habitat destruction by fishing gear remain problems, despite some recent improvements. Species management efforts

are also directed toward the recovery of threatened and endangered species.

The Arctic is home to countless numbers of marine and terrestrial migratory wildlife that over-winter in other parts of the globe. Conservation of these species, therefore, requires not only local action but co-operation and collaboration with the global community.

Conservation responses to industrial and other development include environmental impact assessments. Such assessments typically include analysis of direct and indirect impacts, although they are limited by the difficulty of predicting the complex ecological consequences of human activities. Cumulative impact assessments, analysing the combined effects of several development activities, are a relatively recent innovation. One benefit of environmental assessments has been to set out measures to minimize negative impacts.



Arctic willow

Tourism is another form of economic development that is increasing, with consequences for the environment. Efforts are underway to develop effective management policies for tourism in the Arctic, focusing on minimizing impacts and respecting local cultures.



Left-overs from World War II, Northeast Greenland National Park

Pollution, ozone depletion, and climate change pose widespread, though often diffuse, threats to the Arctic. Pollution comes both from local sources and from the long-range transport of industrial and agricultural pollutants from temperate and tropical areas. Because these long-distance pollutants originate outside the Arctic, reducing them and their impacts on the Arctic requires international action. Ozone depletion occurs primarily in the polar regions each spring. The loss of ozone allows more ultraviolet radiation to reach the earth's surface, where it can harm plants and animals. International conventions to eliminate ozone-depleting chemicals appear to be having some effect, but more monitoring is needed. Climate change is expected to affect the polar regions soonest and to the greatest extent. Scientists and indigenous people are reporting signs of substantial change around the Arctic. The ecological effects of climate change will also lead to social, cultural, and economic changes.

Arctic conservation is also a question of educating the public and influencing human attitudes towards the environment. Research and monitoring are needed to acquire basic information about how the Arctic ecosystem functions and what threats it faces. This information needs to be disseminated via public education programs that can help build support for conservation by creating awareness of what needs to be conserved and why and by demonstrating the full range of values of the natural world.

Conservation Issues and Recommendations

The overall goal of Arctic nature conservation is to ensure that Arctic ecosystems and their biodiversity remain viable and vigorous for generations to come and, therefore, able to sustain human socio-economic and cultural needs.

Although most of the Arctic environment is relatively undisturbed, the threats it faces are intensifying and spreading. Economic and other demands on the Arctic and its resources are increasing. Petroleum and mineral development, tourism, shipping, hydroelectric dams, and commercial fishing are among the activities with large potential and actual impacts. Achieving conservation

while also allowing for sustainable forms of economic growth is a significant challenge.

The following recommendations flow from the major issues and trends identified in *Arctic Flora and Fauna: Status and Conservation* (CAFF 2001). The recommendations address five key conservation challenges in the Arctic: conserving species, conserving ecosystems and habitats, assessing and monitoring biodiversity, addressing global issues, and engaging society in conservation.

While the recommendations stem from a CAFF report, they are by no means directed solely at the CAFF community. Conservation requires the active participation of all sectors of society. These recommendations are presented in the hopes of encouraging greater co-operation and collaboration in Arctic conservation for the shared benefit of all.



Thyme-covered lava field

Conserving Arctic Species

The overall goal is to maintain vigorous populations of Arctic plant and animal species.

The Arctic environment has created many species and types of flora, fauna, and habitats not found elsewhere in the world. Many species, such as seabirds, caribou, and polar bears, transcend national boundaries, and are important to the lives and livelihoods of local and indigenous peoples. These wide ranging species,

has not been assessed. Meanwhile, the potential impacts of genetically modified organisms (or GMOs) remain unstudied. Although current data show that several Arctic species are threatened by both local and global anthropogenic impacts, there is simply too little information to properly assess the degree of threat to the Arctic as a whole.

Examples exist of how countries can collectively address the conservation and sustainable use of Arctic flora and fauna. The Agreement on Conservation of Polar Bear (1973), and the CAFF conservation strategies and action plans for murre/guillemots (1996) and eiders (1998) have improved the conservation of these species. Common guidelines, international hunting and fishing quotas, and seasonal restrictions are also effective conservation measures. For some commercially important species groups, such as fish and whales, international protection regimes already exist. Other common species or species groups, including Arctic plants and plant communities, shorebirds, Arctic fox, wolf, wolverine, caribou/reindeer, walrus, and ice seals, may need concerted attention.



From Greenland

together with several that are either vulnerable or endangered, are considered to be of *common conservation concern* among the Arctic nations.

Arctic flora and fauna face threats from many different sources. The impacts of climate change are increasingly evident in the Arctic, triggering changes in the abundance and behavior of Arctic species.

Resource exploitation, habitat fragmentation, and pollution also affect a variety of biotic changes. Numerous examples exist of invasive non-endemic species causing serious disturbance to native species, but the long-term impacts of these

CAFF recommends that the Arctic States in collaboration with indigenous people and communities, other Arctic residents, and stakeholders:

- Identify threats to Arctic species of common conservation concern, and implement necessary conservation measures for species of concern that currently lack concerted international actions.
- Assess the scope and impacts of non-endemic species in the circumpolar Arctic and develop appropriate response strategies.

Conserving Arctic Ecosystems and Habitats

The overall goal is to maintain and enhance ecosystem integrity in the Arctic and to avoid habitat fragmentation and degradation .

Conserving Arctic flora and fauna cannot occur in isolation from the physical and biological environment and processes in which they exist and on which they depend.

As Arctic ecosystems come under increasing pressure, habitats are degraded, species decline, and ecosystem functions are lost. A stark example is the insidious threat of habitat fragmentation resulting from road construction, resource development, and other human activities. A recent United Nations Environment Programme (UNEP) report forecasts that at current rates of activity , by 2050, 50-80% of the Russian Arctic will be affected by human activity with the consequent loss of natural habitats and ecosystem functioning.

One important means of conserving ecosystems and habitats and, increasingly , cultural heritage, is through protected areas.

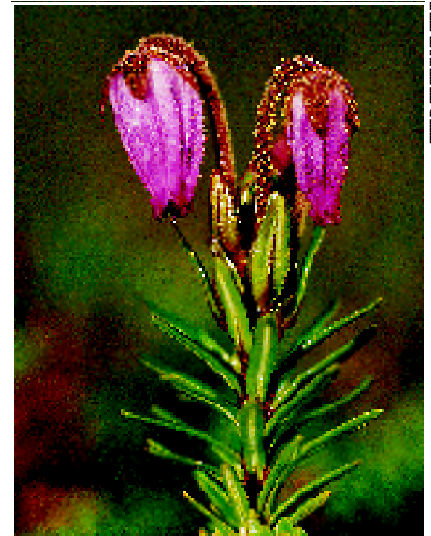
Collectively , the Arctic countries through CAFF have promoted the establishment of a Circumpolar Protected Areas Network (CPAN), which aims to link protected areas throughout the Arctic, ensure adequate representation of the various biomes, and increase the public's understanding of the benefits and values of protected areas throughout the region. Within the current protected area regimes, however , many productive areas such as coastal zones and other marine areas are vastly under - represented. Protected areas only cover a portion of the total landscape and so action is needed to conserve habitats and

ecosystems beyond their confines. Such measures include proper land-use planning and regulation, assessments of the long-term combined or cumulative effects, efforts to mitigate the impacts of development, and the development of methods of integrated ecosystem conservation.

Additionally , within Russia there are efforts to document and design conservation strategies for sacred sites of Russian Arctic indigenous communities, and to demonstrate integrated ecosystem management in a few model areas with globally important biodiversity features. There is a need to strengthen these efforts and to ensure that proper habitat conservation measures are in place before major development activities are undertaken (following the principle of “conservation first”).

CAFF recommends that the Arctic States in collaboration with indigenous people and communities, other Arctic residents, and stakeholders:

- Identify important freshwater , marine and terrestrial habitats in the Arctic and ensure their protection through the establishment of protected areas and other appropriate conservation measures.
- Promote an ecosystem approach to resource use and management in the circumpolar Arctic, through, *inter alia* , the development of common guidelines and best practices.



Blue heath

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Assessing and Monitoring Arctic Biodiversity

The overall goal is to monitor status and trends in Arctic biodiversity as an integral part of assessing the overall state of the Arctic environment.

Baseline information and data are needed to understand the Arctic ecosystem and its health. This is a prerequisite for sound conservation decisions and actions, and for assessing the effectiveness of such measures. Monitoring programs represent an important instrument in addressing this need.



Unidentified wildflower in Denali National Park

Information on the physical and chemical environment of the Arctic is relatively strong. Reasonably long-term information on climate, for example, indicates both warming and cooling trends in different areas of the Arctic. Similarly, AMAP has established circumpolar baseline information and trends in environmental pollutants, including those in some target biota.

In contrast, and with the exception of a few commercially valuable vertebrate species,

circumpolar data on most flora and fauna are spatially and temporarily limited, inconsistent, and fragmented. Strengthening international co-ordination of monitoring is, therefore, essential to determine species trends and causes of change in the Arctic.

An additional underestimated source of information on trends in Arctic biota is the traditional knowledge of indigenous and local people. Recent joint efforts by the Nunavut Planning Commission and the Government of Canada to establish a Nunavut General Monitoring Program can be taken as an example of how to incorporate this critical component into monitoring schemes.

In order to address these concerns, CAFF has recently launched circumpolar monitoring networks for eight key species and species groups, building on existing initiatives. There is a need to establish additional species and site-based networks, to organise their data gathering and management, and to integrate this information with other regional and global monitoring systems.

CAFF recommends that the Arctic States in collaboration with indigenous people and communities, other Arctic residents, and stakeholders:

- Promote activities that identify and classify Arctic species and ecological processes to better understand Arctic ecosystems.
- Build on national and international work to implement a program to monitor biodiversity at the circumpolar level that will allow for regional assessments, integration with other environmental monitoring programs, and comparison of the Arctic with other regions of the globe.

Global issues

The overall goal is to understand and minimize the impacts of global changes and activities on Arctic biodiversity.

Conservation of flora and fauna cannot end at the artificial boundaries drawn by humans between the Arctic and the rest of the globe. Hundreds of species, for example, migrate between the Arctic and virtually all habitats in every corner of the Earth. For these species to thrive, they must be adequately protected throughout their entire ranges. The same applies to more stationary species of Arctic flora and fauna that have continuous ranges and genetic continuity with populations at lower latitudes.

“Global change” commonly refers to changes in the global environment (including alterations in climate, land productivity, oceans or other water resources, atmospheric chemistry, and ecological systems) that may alter the capacity of the Earth to sustain life. Of particular concern in the Arctic are the threats from long-range pollution and from

global climate change, the impacts of which are expected to be greatest in the polar regions. These topics need to be tackled at an international level and on a global basis.

Several reviews conducted within the Arctic Council serve as good bases for concerted actions within this theme. Some examples include reviews of international instruments relevant to the protection of the Arctic marine environment and to the conservation of migratory birds that breed in the Arctic, as well as the ongoing Arctic Climate Impact Assessment (ACIA).

CAFF recommends that the Arctic States in collaboration with indigenous people and communities, other Arctic residents, and stakeholders:

- Assess the interaction between global changes and Arctic biodiversity, and develop strategies to address negative impacts.
- In co-operation with non-Arctic states, strengthen conservation measures for those migratory species that lack adequate protection outside of the Arctic.



Mating display of ruff in Kevo Strict Nature Reserve, Finland

Engaging Society

■ *The overall goal is to promote circumpolar and global awareness of Arctic biodiversity issues.*

Ultimately, the long-term effectiveness of conservation measures depends on society's understanding of issues affecting the Arctic and its support for action. One important mechanism to engage society in conservation is to provide better access to information and to educate the public and decision-makers about the Arctic environment, its biodiversity, and the relationship that humans have with it. Publications such as *Arctic Pollution Issues:*

A State of the Arctic Environment Report (AMAP 1997) and *Arctic Flora and Fauna: Status and Conservation* (CAFF 2001) have been significant contributions to this effort. The *Arctic Bulletin*, published by the WWF-Arctic Programme, provides a continuous source of information on Arctic conservation and protection activities and issues. Numerous other newsletters, websites, and specialised reports, covering a range of Arctic conservation issues, have been published as a result of Arctic Council activities.

In addition to education, the active participation of indigenous people and local communities in conservation work is essential to foster better communication, understanding, and co-ordination between researchers, managers, and resource users. For this, further development of Arctic protocols for international programs such as the Globe Learning Program and similar community- and school-based environmental programs should be encouraged.

CAFF recommends that the Arctic States in collaboration with indigenous people and communities, other Arctic residents, and stakeholders:

- Document and incorporate into decision-making the full range of values of Arctic natural resources.
- Promote formal and public education, including outreach to non-Arctic countries, on the values, conservation, and sustainable use of Arctic natural resources.
- Encourage the participation of Arctic indigenous people, local communities, and schools in conserving and monitoring of Arctic species and ecosystems.



Rock ptarmigan

Looking to the Future

Arctic Flora and Fauna: Status and Conservation began with the question, “What is the overall state of the Arctic environment?” A simple answer might be that the Arctic is generally in good condition. As the report makes clear, however, such a reply is inadequate. Much of the Arctic is indeed in its natural state, where the impacts of human activity are relatively minor. But some areas have been devastated by local development or pollution, certain animal populations have been vastly over-exploited, and long-range contaminants and global change processes present diffuse threats to the region as a whole. The long-term cumulative consequences of these impacts remain unknown. Globalisation continues to link the Arctic more and more inextricably to the rest of the world, making it essential for Arctic countries to consider conservation issues in a global context.

The Arctic has many special and unique features. Many of its stark and beautiful landscapes and seascapes are pristine. Its flora and fauna are distinctive and highly adapted to the cold and dryness that characterize much of the region for most of the year. The many indigenous communities remain linked to their lands

and waters, a connection between humans and the environment that is increasingly rare elsewhere. In much of the world, conservation is now a question of protecting what little is left or of trying to restore what has been damaged. In this respect, the Arctic offers a rare opportunity to put sustainable development into practice and to apply solid conservation measures not as an afterthought, but as a priority.

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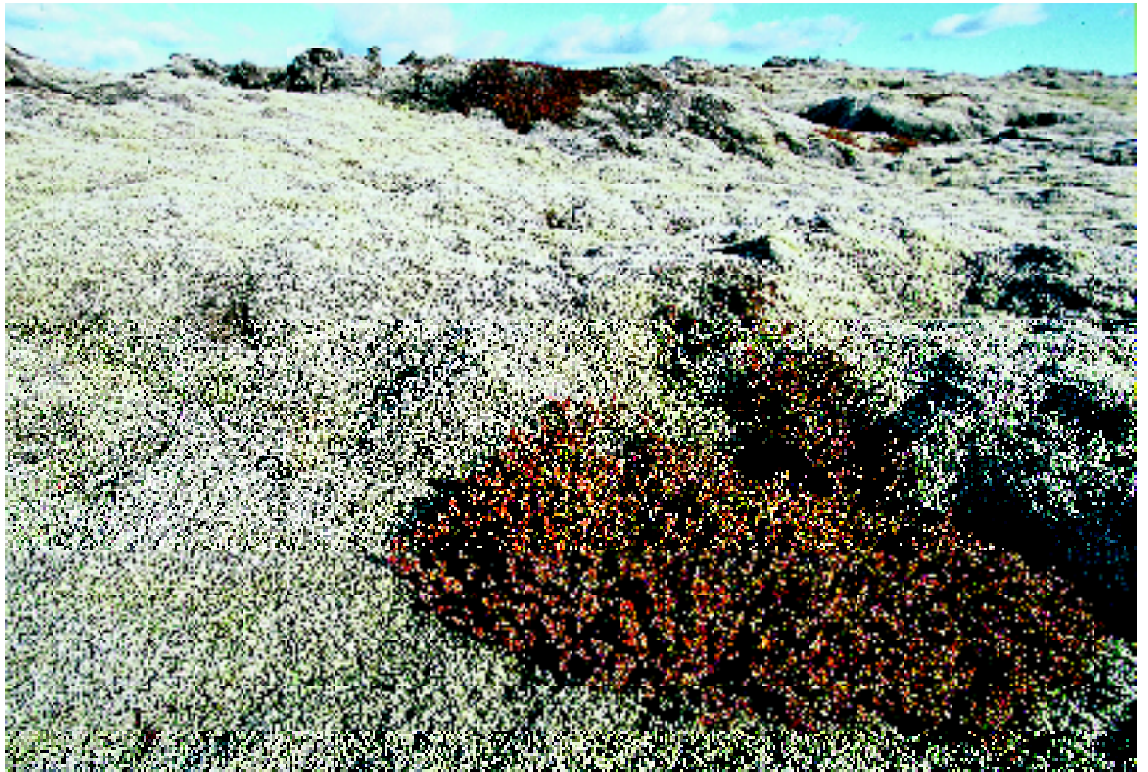


Mountain avens is a circumpolar species



Arctic tern

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Racomitrium mossheath with crowberry