NORWEGIAN MINISTRY OF THE ENVIRONMENT

Strategy on Invasive Alien Species

Published May 2007

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FOREWORD

The Norwegian Government's target is to halt the loss of biodiversity by 2010. This is an ambitious target, and achieving it will require efforts by all sectors that have impacts on biodiversity. We are therefore pleased to be able to present Norway's first cross-sectoral strategy on invasive alien species, which will be an important element of the Government's efforts to achieve its biodiversity target.

Alien species are a growing problem in Norway. Globally, they are considered to be one of the most serious threats to biodiversity.

The large volume of trade and travel in the modern world increases the risk that animals, plants and microorganisms will be brought along as "hitchhikers" and be released in areas where they do not occur naturally. Most alien species do not survive in their new surroundings, but some are able to establish themselves. From hard experience, we know that some of them will cause considerable problems in both ecological and economic terms. Unfortunately, it is very difficult to predict which species will cause problems and which will be relatively harmless.

The Government has therefore based its strategy on invasive alien species on the precautionary principle. The main focus is on efforts to prevent alien species from being introduced to Norway. We will also follow a restrictive approach to granting permission for the intentional introduction of alien species.

Last but not least, we will intensify efforts to control and contain and, if appropriate, eradicate alien species that are a threat to Norwegian biodiversity or to commercial activities based on natural resources and the environment.

Norway's policy is that each sector is responsible for the environmental impacts of its own activities. This strategy shows that the sectors are assuming their responsibility.

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CHAPTER 1: INTRODUCTION

The introduction of invasive alien species is considered to be one of the most serious threats to global biodiversity. Alien species can also have substantial economic and social impacts.

People have moved plant and animal species to new areas throughout history: often, this has been for our own benefit, to use them as agricultural crops or livestock. In many cases, the consequences of such introductions have been mainly positive or neutral.

More recently, there has been a considerable rise in introductions of alien species, particularly as a result of changes in international patterns of transport and trade. This has resulted in growing awareness of the negative impacts certain species can have when they are introduced outside their natural distribution ranges.

In Norway, too, the introduction and spread of invasive alien species is a serious and growing threat to the conservation of biodiversity and ecosystem functions, and has already inflicted heavy costs on society.

Dealing with alien species involves a complex set of challenges. Most introduced species are not able to survive and spread in the wild. Others become established without harming the ecosystems where they are introduced. But some species both become established and cause significant damage to ecosystems, for example by displacing native species or spreading disease. These are known as invasive alien species, and they can have very serious negative impacts, both on ecosystems and biodiversity and on industries such as agriculture, fisheries and aquaculture that are based on the use of these ecosystems.

Measures to address the problem of invasive alien species in Norway will also be important in efforts to achieve the target of halting the loss of biodiversity by 2010. Under the UN Convention on Biological Diversity (CBD), Norway has undertaken as far as possible and as appropriate to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

Many different bodies in a range of administrative sectors are responsible for action to address the problem of alien species and for administration and enforcement of legislation relating to the introduction, spread, and management and control of alien species. Effective action to reduce the threat from alien species therefore requires targeted and coordinated cross-sectoral efforts. The decision to draw up a cross-sectoral national strategy on alien species was taken in the 2005 white paper on the government's environmental policy and the state of the environment in Norway (Report No. 21 (2004–2005) to the Storting) and the subsequent debate in the Storting.

This document describes Norway's goals and principles for dealing with alien species and specific measures that will be implemented in all relevant administrative sectors. The strategy is intended to ensure that there is a common understanding and

consistent way of dealing with problems relating to alien species, regardless of which sector is affected or is responsible for addressing the problems.

In this document, the term “alien species” is used to mean species, subspecies or lower taxons, including populations, that have been introduced outside their normal range by human activities. Species that alter their range as a result of climate change, whether natural or anthropogenic, are not considered to be alien species, and this strategy does not apply to them.

The administrative sectors involved have drawn up the programme of measures, which describes what should be done in the short term to prevent alien species from causing damage to the environment or to the health of domesticated animals and plants. The strategy focuses on new measures and does not describe activities and measures that have already been carried out and completed. It is also intended to provide a basis for coordinated development of measures and instruments in the longer term.

Once an invasive alien species has become established in the wild, it is often a very difficult and costly process to limit damage and contain the species. In marine ecosystems, which have more open boundaries than terrestrial and freshwater ecosystems, it is particularly difficult to bring species under human control in this way. The Norwegian authorities are therefore focusing their efforts mainly on preventive measures, i.e. measures to prevent new invasive alien species from being introduced into the Norwegian environment.

It is very difficult to know in advance which alien species are likely to be harmful and which will have neutral or insignificant impacts if they are introduced. This is why the precautionary principle is a key element of the authorities’ strategy on invasive alien species.

A number of ministries have cooperated in drawing up Norway’s strategy: the Ministry of Fisheries and Coastal Affairs, the Ministry of Finance, the Ministry of Defence, the Ministry of Health and Care Services, the Ministry of Justice and the Police, the Ministry of Education and Research, the Ministry of Agriculture and Food, the Ministry of Petroleum and Energy, the Ministry of the Environment, the Ministry of Trade and Industry and the Ministry of Transport and Communications. Other government agencies involved in work on alien species have also contributed: these include the Directorate for Nature Management, the Directorate of Fisheries, the Institute of Marine Research, the Norwegian National Rail Administration, the Norwegian Food Safety Authority, the Norwegian Institute of Public Health, the Norwegian Water Resources and Energy Directorate, the Norwegian Public Roads Administration, the Governor of Svalbard, the Directorate of Customs and Excise and the National Veterinary Institute. The work was coordinated by the Ministry of the Environment.

This strategy does not deal with disease control measures within the health sector, where alien species have impacts primarily on human health and not on animal health or biodiversity. Nor does it apply to genetically modified organisms (GMOs), for which Norway has established legislation and cooperation routines under the Gene Technology Act. However, there are many similarities between GMOs and alien

species, and experience of work on GMOs may be relevant in the development of legislation and in cross-sectoral cooperation and management of alien species.

Several of the species used in fish farming are domesticated variants of species that occur in the wild in Norway. It is a matter of opinion whether or not these should be classified as alien species. The Norwegian authorities consider the presence of escaped farmed fish in the wild to be undesirable, and have implemented a number of measures to reduce this problem. These issues were discussed in Proposition No. 32 (2006–2007) to the Storting on the protection of wild Atlantic salmon (*Salmo salar*), and are not dealt with further in this strategy.

In May 2007, the Norwegian Biodiversity Information Centre presented a Norwegian Black List of alien species that may have negative impacts on ecosystems, indigenous species or genotypes in Norway. The first edition of the Black List is based on ecological risk analyses of about 220 alien species that already occur in Norway. The Black List will provide a better scientific basis for setting priorities and further developing measures to combat invasive alien species in the sectors responsible for this.

The following Norwegian websites provide more information on alien species in Norway:

- Directorate for Nature Management: http://www.dirnat.no/content.ap?thisId=2975
- Ministry of the Environment: http://odin.dep.no/md/norsk/tema/naturmangfold/fremmede_arter/bn.html
- Norwegian Biodiversity Information Centre: http://www.biodiversity.no

More information on alien species can also be found on the following websites:

- Convention on Biological Diversity: http://www.biodiv.org/programmes/cross-cutting/alien/default.shtml
- North European and Baltic Network on Invasive Alien Species, NOBANIS: http://www.nobanis.org/

CHAPTER 2: BACKGROUND

The 2005 white paper on the Government's environmental policy and the state of the environment in Norway (Report No. 21 (2004–2005) to the Storting) presents a number of measures designed to halt the loss of biodiversity by 2010. These are discussed in Chapter 2 on key priorities and in Chapter 3 on conservation and sustainable use of biodiversity. One of the measures concerns alien species and reads as follows:

The Government will:

- *Draw up a cross-sectoral national strategy for alien species by 2006*

In the white paper, the Government indicates that the strategy must include the following:

- *measures to prevent the spread of alien tree species through forestry activities, to prevent the spread of alien plant species along roads and other types of transport infrastructure, and to prevent the spread of alien species and populations through aquaculture activities. Implementation of the Ballast Water Convention, which Norway plans to ratify in 2005, will be important in connection with the preparation of the strategy.*

In addition, the white paper states that:

In the course of 2006, the Norwegian Biodiversity Information Centre will draw up a "black list" of alien species that may threaten or are already threatening ecosystems, habitats or other species in Norway. Efforts to survey and monitor priority alien species will be intensified. A review of the economic consequences of introductions of alien species will be initiated, among other things as a basis for cost-benefit analyses of relevant methods of eradication, containment and control. Steps will be taken to build up Information on the impacts of introductions of alien species.

The Standing Committee on Energy and the Environment considered the white paper on 2 June 2005. A majority of its members agreed that a cross-sectoral strategy should be drawn up for further work on alien species. A majority of the committee also pointed out that not all introduced species should be classified as invasive and undesirable, and pointed to the example of plant species used in agriculture and horticulture. The committee also referred to earlier debate on the red king crab (*Paralithodes camtschaticus*), expressed concern at its rapid spread, and referred to two proposals that were adopted in the Recommendation S. No. 192 (2004–2005) to the Storting on industrial and commercial development of marine resources. The majority of the committee also asked for measures to be taken to prevent further spread of the minnow (*Phoxinus phoxinus*).

CHAPTER 3: DEFINITIONS

The following definitions are used in this strategy:

Alien species – a species, subspecies or lower taxon, including a population, introduced outside its natural past or present distribution. This includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce.

Invasive alien species – an alien species whose introduction and/or spread may threaten native biodiversity and/or the health of domesticated plants and animals.

Species – groups of natural populations that interbreed and that are reproductively isolated from other such groups.

Introduction – the movement by human agency, direct or indirect, of an alien species outside its natural range. This movement may be either within a country or across national borders.

Intentional introduction – the deliberate movement and/or release by humans of an alien species outside its natural range.

Unintentional introduction – all other introductions that are not intentional.

Secondary introduction – a secondary introduction takes place as the result of an intentional or unintentional introduction into a new area, when the species disperses from that point of entry into areas it could not have reached without the initial (primary) human-mediated introduction.

Biodiversity – variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

CHAPTER 4: THREATS, CAUSES AND IMPACTS

General background

Animals and plants have been migrating northwards into Norway ever since the ice sheets began to retreat at the end of the Ice Age about 10 000 years ago, resulting in the biodiversity we now find in the Norwegian environment. Natural barriers to dispersal such as the sea, mountains and rivers have meant that ecosystems and their plant, animal and microorganism communities have developed in different ways. Climatic, chemical and physical conditions have also limited the geographical areas of Norway where various species have been able to become established. To some extent, species have become adapted to their habitats in Norway, although the degree of local genetic adaptation is limited in the relatively "young" ecosystems we find in Norway.

Although the Norwegian environment is young in geological terms, many fairly stable, well-established ecosystems have developed. These include both more or less undisturbed ecosystems such as virgin forest, and semi-natural ecosystems such as hay meadows and coastal heaths. A common feature of all such ecosystems is that they contain many specialised species that may disappear when environmental conditions change, for example as a result of the introduction of alien species.

Today, the rapid growth in the volumes of goods and passenger transport and the elimination of border controls between countries and continents are resulting in dramatic change, and many species are being spread to new areas where they do not occur naturally. Alien species are introduced from all parts of the world, whether deliberately as commodities or as stowaways on people, animals, plants, goods and vehicles. In the long term, much of the variety in nature and a great deal of biodiversity may be lost.

The consequences of the current trends are largely unknown. It is difficult to predict whether or not an organism that is introduced to a new area will become a problem. Most alien species in Norway die out rapidly because they are not adapted to the local ecosystems. However, in some cases there are no natural enemies to regulate the populations of new species, or other characteristics allow them to survive in a new environment. Moreover, it may take many years before an introduced organism shows signs of being invasive. For example, the sycamore (*Acer pseudoplatanus*) was introduced to Norway as an ornamental tree about 250 years ago, but it has only begun to spread widely and become invasive in the last 30–40 years. The sycamore is now considered to be a problem in several protected areas that were established to maintain Norwegian deciduous broad-leaved forests.

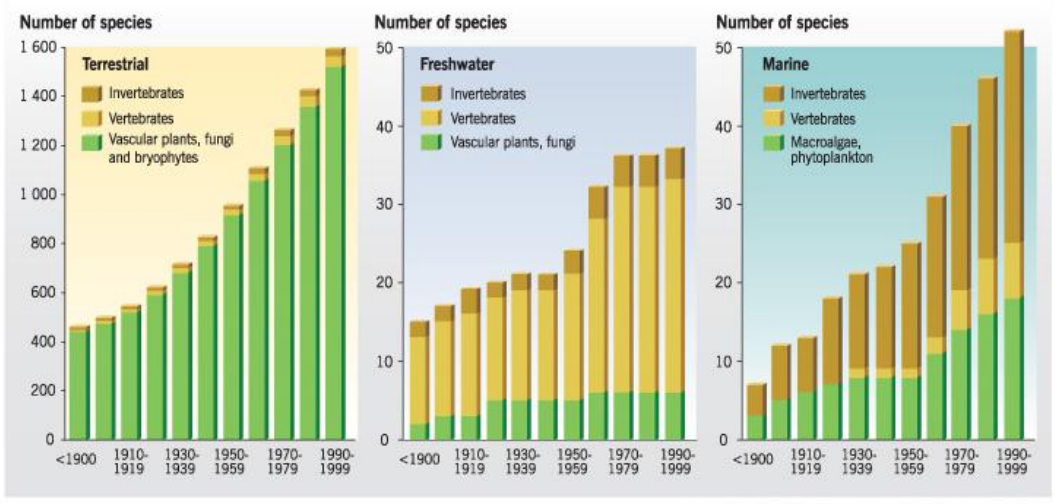
At global level, the spread of alien species is one of the most serious threats to biodiversity[1]. Norway is one of 190 parties to the UN Convention on Biological

[1] For example, the UN Millennium Ecosystem Assessment states, "*The most important direct drivers of change in ecosystems are habitat change (land use change and physical modification of rivers or water withdrawal from rivers), overexploitation, invasive alien species, pollution, and climate change*". (http://www.maweb.org/documents/document.356.aspx.pdf)

Diversity (CBD), and has thus undertaken as far as possible and as appropriate to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species."

Even though many alien species do not have negative impacts, the examples we have seen of problems caused by invasive species show that it is essential to have good routines for evaluating whether the introduction of an organism to a new area should be permitted. Carrying out an environmental risk assessment before the intentional introduction of an alien organism is difficult, but it must be done. The ecological interactions between alien and native species are complex, and there are still many gaps in our knowledge. The intentional introduction and release of alien species must therefore only be permitted after thorough evaluations based on the precautionary principle. One example of routines for such evaluations is set out in the 2004 *ICES Code of Practice on the Introductions and Transfers of Marine Organisms*. Alien species that may be invasive in the Norwegian environment include species that are intentionally or unintentionally introduced into the country and also those that occur naturally in Norway but that are spread to new areas through human activity.

The boundaries between marine ecosystems are less clear-cut than those between terrestrial and freshwater ecosystems, so that the marine environment is more continuous. This means that organisms spread more readily between and through different areas of sea, particularly those that are pelagic for part or all of their life cycles. Factors that govern water transport therefore have a strong influence on the transport and dispersal of organisms in the marine environment. Nevertheless, there is wide variation in ecosystems and in the species found in different sea areas, and this is true within Norwegian waters as well. Factors such as salinity, temperature, currents, wave exposure and bottom types are important in determining which species are found in an area, and also in determining which new species will be able to establish themselves in an ecosystem.



Numbers of alien species registered in freshwater, marine and terrestrial ecosystems in the Nordic countries (Norway, Sweden, Denmark, Finland and Iceland). Source: NOBANIS. According to the most recent overview from the Norwegian Biodiversity Information Centre (May 2007), almost 2500 alien species have been registered in Norway.

Alien species have spread to many protected areas; the most conspicuous examples in Norway today are the sycamore and the Japanese rose (*Rosa rugosa*). Both of these are able to outcompete native species, and are therefore in many cases considered to be a threat to the habitats that the conservation measures are intended to protect. Alien tree species are a threat to many protected areas, and have been particularly widely planted in Western and North Norway. Several of these species can set viable seed in Norway, and some have spread extensively from the sites where they were originally planted. In the long term, more protected areas will come under threat unless control measures are implemented both within and outside protected areas.

European tree frog (*Hyla arborea*)

This frog was found in the fruit aisles of a supermarket in Trondheim in April 2007. The species is not native to Norway, and probably arrived with a consignment of fruit from Spain. Live animals and plants that enter the country as hitchhikers on imported goods are a serious problem. Photo: Heidi Hansen

Species that have previously been introduced to Norway without being able to establish significant populations or spread to any great extent may become invasive in future as a result of global anthropogenic climate change.

Social and economic impacts

Invasive alien species are not only a threat to natural ecosystems and wild plants and animals; they have also had serious impacts on human health and the health of domesticated plants and animals. It is a constant challenge to deal with the introduction of disease-causing organisms that are imported with animals, plants, goods and transport equipment. There are several examples of alien species that are causing damage in Norway (more examples can be found in the sections on problems within individual sectors).

- The salmon parasite *Gyrodactylus salaris* came to Norway with imported salmon smolt and rainbow trout (*Oncorhynchus mykiss*) fingerlings from Sweden in 1975. *Gyrodactylus* now causes annual losses in the order of NOK 200–250 million in Norwegian river systems.
- The alga *Chattonella cf. verruculosa* caused serious losses in the fish farming industry along the coast of Southern Norway in 2001. Almost 1000 tonnes of farmed fish worth NOK 25 million died. The alga was first registered in Norway in 1998, and may have reached Europe from the Far East with ballast water.
- Efforts to eradicate the South American leafminer *Liriomyza huidobrensis* cost the horticulture industry NOK 40–50 million in 2002. The species reached Norway as a stowaway on imported plants.

- In the period 1969–74, the opossum shrimp *Mysis relicta* was released as a food species for trout in nine regulated lakes in Central Norway in order to mitigate the adverse impacts of hydropower developments. In one lake, Selbusjøen, this had an unintended negative impact: the Arctic char (*Salvelinus alpinus*) population dropped as a result of competition between *Mysis* and char. The Norwegian Supreme Court granted the landowners NOK 5 million in damages.
- Bioforsk, the Norwegian Institute for Agricultural and Environmental Research, was commissioned by the Directorate for Nature Management to investigate the costs of the unintentional introduction of potato blight *Phytophthora infestans* and the western flower thrips *Frankliniella occidentalis*. Bioforsk concluded that the annual costs of potato blight, including crop yield losses and the costs of eradication and advisory measures, amount to NOK 55–5 million. For the western flower thrips, the annual costs are between NOK 436 and 582 million, given yield losses of 30–0%.

Globally, the costs of dealing with alien species are high in various sectors, including agriculture, forestry, fisheries and health care. Cornell University has calculated that in the US alone, the overall costs are an estimated USD 123 billion a year. Control costs are highest for crop weeds and animal pests in the agricultural and forestry sectors.

Minnow (*Phoxinus phoxinus*)

For many years, human activity has helped to spread the minnow to new areas of Norway, and it is probably becoming the most widely distributed freshwater fish in the country. The minnow is a small fish belonging to the carp family: it can reach a length of up to 15 cm, but does not usually grow much beyond 8–10 cm. Its natural distribution in Norway was largely limited to lower-lying areas in southeastern Norway and some of the larger rivers in Finnmark county in the far north. It has now been spread to every county in Norway (see map), mainly as a result of deliberate and accidental releases and the use of live bait.

Minnows are very adaptable and can establish dense populations that displace native fish stocks. Trout stocks in many lakes have declined greatly after the introduction of minnows. Thus, the spread of minnows is a threat not only to biodiversity, but also to the value of Norway's river systems for angling and outdoor recreation. The introduction of minnows to the Hardangervidda mountain plateau has resulted in competition for food between birds and fish and displaced red-listed diving ducks such as velvet scoter (*Melanitta fusca*) and scaup (*Aythya marila*). Minnows are now spreading to the Namsen river in Nord-Trøndelag, where they may be a serious threat to the critically endangered dwarf stock of Atlantic salmon in the river, which is unusual in spending its whole life cycle in fresh water.

In 1999 and 2000, rotenone treatment was carried out to eradicate minnows from the Hardangervidda and prevent their spread to rivers in the central part of the plateau. The treatment cost about NOK 4 million, and has so far been successful. In 2005, NOK 2 million was allocated to measures to prevent the spread of minnows and certain other freshwater organisms. This has been used to map the occurrence of minnows in the Namsen river system. Some of the tributaries of the Namsen were treated with rotenone to prevent minnows from become established in the main river. Funding was also provided for information activities to prevent the spread of minnows and for trap fishing to remove them from certain localities. Photo: Bjørn Ove Johnsen

Agriculture

The introduction of alien species can have serious impacts in the agricultural, forestry and horticultural sectors as regards plant health, animal health and food security. Invasive alien species that are intentionally or unintentionally introduced in connection with these activities can also constitute a threat to biodiversity.

Forestry

There are two main issues to be considered relating to alien species and the forestry industry. One is the use of alien tree species in forestry, and the other is problems that can arise in connection with imports of timber and wood products.

About 50 introduced tree species have been used in Norwegian forestry. About 10 of these have been planted more widely than in purely experimental plots. Alien species have been particularly widely used in afforestation in Western and North Norway. The total area that has been afforested in Western Norway is about 160 000 hectares, which is equivalent to 18% of all productive forest in the region. The corresponding figures for Nordland and Troms counties in North Norway are 0.9 million hectares and about 10% of all productive forest in these counties. Most of the total area afforested and also areas replanted with different tree species have been planted with Norway spruce (*Picea abies*), which does not occur naturally in Western Norway or most of North Norway.

In 2005, about 3.5% of all trees planted were of alien species, and about 75% of these were planted for the production of Christmas trees and ornamental greenery. This means that alien species accounted for 0.9% of the trees planted in forested areas, or about 15 000 plants. This is somewhat lower than the average for recent years. There is no prohibition against using alien tree species, but the new Forestry Act and regulations on sustainable forestry will be used to regulate the use of introduced tree species. In recent years, the National Forest Inventory, a national monitoring programme, has been expanded to include alien tree species and their spread, and various projects have been carried out to gather information on alien tree species in Norway. Research in this field and analyses of the effects of

Sycamore (Acer pseudoplatanus)

The sycamore is native to hilly and mountainous areas of central and southern Europe. It was introduced to Norway as an ornamental tree, probably around 1750. It has gradually become established in various forest habitats, and has become the dominant broad-leaved tree in certain areas. It can also be found in spruce forest. It is now spreading very rapidly, and observations from the coast and fjords of Western Norway show that it is competing strongly with native deciduous broad-leaved trees. Photo: Hilde Friis Solås

introduction of alien species and genotypes are being funded through the research programme Biological Diversity (1998–2007). Norwegian forestry policy is no longer focusing on further afforestation and replanting of different tree species using alien species.

However, there are problems related to the alien tree species that have already been planted. The Ministry of Agriculture and Food has funded a project run by the Norwegian Forest and Landscape Institute to study the natural spread of alien tree species. Certain species have proved to have the high dispersal ability in the Norwegian environment. They may have major ecological effects on a local scale.

More than 2 million m^3 of timber is imported to Norway every year. Most of it comes from the Baltic states and the European part of Russia, where ecosystems are similar to those in Norway and there are few pest species that are not also found in Norway. Nevertheless, there is a risk that alien species will be imported with timber. Since 1999, field studies have been carried out in Russia, and ports where timber is imported to Norway have been monitored. Many species have been found on imported timber. Most of these occur in Norway, but some new species have been registered. The dispersal ability of such species and the effects they may have on Norwegian ecosystems are being assessed on a continuous basis.

Wood that is not sufficiently dried or completely debarked can be a pathway for the introduction of pest species. A number of countries require documentation that the moisture content of imported wood does not exceed 20%; alternatively, the wood can be debarked. These requirements have been introduced because pests can survive in the bark if the moisture content is too high. Many countries have also introduced phytosanitary regulations for the import of wooden pallets and other packaging materials of wood for imported goods.

Agriculture and horticulture

Growing international trade, travel and other activities are putting increasing pressure on plant health. To maintain good plant health in Norway, the authorities are therefore giving high priority to preventing the introduction and spread of plant pests and to combating or eradicating any outbreaks of such pests in the country.

Many different species are imported, produced and sold as plants, including seeds and other plant propagating material, and may be used for agriculture or horticulture (open-air production or in greenhouses), or in parks, private gardens and so on.

South American Leafminer (*Liriomyza huidobrensis*)

Since 1995, there have been a number of finds of South American leafminers in Norwegian greenhouses. So far, the species has been successfully eradicated by a concerted effort in each greenhouse where it has been found. Leafminers puncture leaves to lay their eggs, and the larvae tunnel through the leaves, creating irregular “mines”. Damage to the leaves reduces crop yields and reduces the value of ornamental plants. In 2002, eradication measures cost the horticulture industry NOK 40–50 million. The species reaches Norway as a hitch-hiker on imported plants. Photo: Bioforsk

The Ministry of Agriculture and Food regulates trade in plants through phytosanitary regulations pursuant to the Food Act. The main purpose of this legislation is to protect plant health, and the risk of the spread of invasive alien species that are not an indirect or direct threat to plant health is therefore not specifically regulated. However, ensuring high phytosanitary standards for cultivated plants also reduces the likelihood that pests will spread to wild plants.

The Norwegian Food Safety Authority is the supervisory authority for plants, parts of plants and other regulated articles that may carry pests that are imported to or produced or sold in Norway. For imports, checks are carried out to ensure that consignments for which this is mandatory[2] are accompanied by satisfactory phytosanitary certificates documenting compliance with Norwegian import requirements. In addition, spot checks of such consignments are made to inspect them for quarantine pests. The Food Safety Authority may also decide to inspect consignments for which phytosanitary certificates are not required.

Spanish Slug (*Arion lusitanicus*)

The Spanish slug was first found in Norway in 1988. It occurs naturally in southern Europe, mainly on the Iberian peninsula and in southern France. It is relatively rare in this area, probably because of the hot and dry conditions combined with the presence of natural enemies. The species has spread rapidly since it was first introduced to Norway. It thrives in the damp, cool Nordic climate, and is found mainly in cultural habitats. Slugs are spread with soil, compost and plant material. The reproductive potential of this species is higher than that of the native black slug (*Arion ater*), which has been shown to decline in areas where there are large numbers of Spanish slugs. This may be both because of interspecific competition and because Spanish slugs eat black slugs. Photo: Lisbeth Gederaas

Norway's Regulations relating to plants and measures against pests prohibit the import of certain plants, parts of plants, organisms and plant pests, and soil from certain areas. The Norwegian Food Safety Authority may nevertheless on application and on certain conditions permit the import of such articles for research or cultivation purposes. The Authority bases its pest risk management on pest risk assessments carried out by the Norwegian Scientific Committee for Food Safety.

[2] Details are set out in Annex 5 of the Regulations relating to plants and measures against pests

The Norwegian Scientific Committee for Food Safety carries out independent risk assessments for the Food Safety Authority, and environmental risk assessments of genetically modified organisms for the Directorate for Nature Management. The Food Safety Authority uses these risk assessments as a basis for its activities and priorities and for input to the ministries on determining an appropriate level of protection. They are also used as a basis for deciding which measures to implement, for example in drawing up new regulations and instructions and when new information on risks becomes available. The Scientific Committee thus plays an important role in the Food Safety Authority's work relating to safe and wholesome food, cosmetics, animal health, animal welfare, plant health and relevant environmental considerations.

The Scientific Committee for Food Safety is an independent organisation with its own secretariat. In addition to providing assessments as requested by the Food Safety Authority, the Committee considers other matters on its own initiative to ensure that important issues are evaluated independently of the priorities of the public administration and politicians.

Any firm that imports, produces or sells plants, including seeds and other plant propagating material, to another stage in the chain of distribution or for commercial cultivation is required to register with the Food Safety Authority. The Food Safety Authority carries out inspection and control of registered firms to prevent the introduction and spread of the serious plant pests listed in the regulations with imported or Norwegian-produced plants. There is no approval scheme for plant species for import or for production and sale, but the import and cultivation of seeds of narcotic plants is prohibited, and Annexes 3 and 7 of the regulations list species that it is prohibited to import or plant and sell.

Japweed (*Sargassum muticum*)

Japweed (*Sargassum muticum*) originally reached Europe (France) attached to the shells of live imported Pacific oysters (*Crassostrea gigas*). It rapidly established populations in the wild, and spread to the southern part of the Norwegian coast with the coastal current. It is now found from the Oslofjord to north of the Sognefjord, and forms dense stands in sheltered localities. It grows fast, particularly in warm summers, and can reach a length of several metres, becoming a nuisance for small leisure craft in harbours. The photograph shows Japweed on the right, and three of the species it can compete with: in the centre, toothed wrack (*Fucus serratus*, appearing dark green), further left, bladder wrack (*Fucus vesiculosus*, lighter green), and on the far left, knotted wrack (*Ascophyllum nodosum*) Photo: Jan Rueness.

Fisheries, aquaculture and imports and other movements of live aquatic organisms

In the marine environment, there are special challenges relating to alien species because boundaries between sea areas are not clear cut, our knowledge of species diversity is inadequate, and it is generally difficult to register new species before they become established in ecosystems, and more difficult than in other environments to eradicate alien species that have become established.

Under Norwegian fisheries legislation, it is prohibited to release organisms and live eggs into fjords or the sea without permission from the Ministry of Fisheries and Coastal Affairs. Permission may be granted in the form of regulations for particular species and specified areas, or in the form of individual decisions.

Alien species have played a major role in the development of the fish farming industry in Europe. Important alien species include the rainbow trout and the common carp (*Cyprinus carpio*). However, the use of alien species in aquaculture has been one of the most important pathways for the introduction of alien species to Norwegian and European waters. Restrictions that have already been introduced have reduced this problem considerably.

Norway now has a general prohibition against the use of alien species in aquaculture, both in fish farms and for sea ranching. There are risks associated with the use of alien aquaculture species, both because they can spread to the wild and because they may carry diseases and parasites. However, the level of risk will depend on how isolated the animals are from the natural environment. Sea ranching involves releasing animals to the natural environment, and using alien species for this would involve intentional introductions, which as a general rule are strictly forbidden. Exceptions can nevertheless be made for the use of alien species in aquaculture if a risk assessment indicates that this will not have an adverse impact on natural ecosystems.

Imports of live aquatic organisms have resulted in the introduction of serious diseases that can threaten the existence of wild populations. As mentioned earlier, the salmon parasite *Gyrodactylus salaris* was introduced to Norway in the 1970s and 1980s, when large numbers of salmon smolt and some rainbow trout fingerlings were imported from Sweden and Finland. So far, 46 rivers have been infected with *Gyrodactylus*. The environmental, fisheries and veterinary authorities are cooperating on a concerted effort to prevent further spread of the parasite and to eradicate it from river systems that have been infected.

American Lobster (*Homarus americanus*)

The American lobster differs from the European lobster (*H. gammarus*) in its greenish-brown colouring and in generally having one or more spines on the underside of the rostrum. However, some European lobsters show similar colouring, and DNA analysis is therefore necessary for definite identification. The American lobster has been shown to carry lethal lobster diseases and parasites that do not occur naturally in the European lobster. Since 1999, American lobsters have been caught a number of times in Norwegian waters, some of them with fertilised roe. The illegal release of live lobsters imported for consumption is believed to be the main source of American lobsters in Norwegian waters.
Photo: Institute of Marine Research

Imports of alien aquatic species to new countries and regions for human consumption can also result in their introduction in the wild. For example, live American lobsters are imported to Norway for sale at fish markets and in fishmongers. In recent years, they have been illegally released at several localities in the southern part of Norway, and may become a serious problem

for the Norwegian lobster stock and for other species in coastal waters. The American lobster is adapted to cold water and can travel several hundred kilometres in the course of a year. Control and information measures are being implemented to prevent further releases of the species.

In the 1960s, Russian scientists intentionally released red king crabs in the Murmansk fjord to provide a new commercial resource for the local population. Since then, the species has spread both eastwards and westwards in the southern part of the Barents Sea, and is probably permanently established. So far, we know little about what negative impacts it may have on the original fauna. In both Russian and Norwegian parts of the southern Barents Sea, observations show that the largest individuals of certain species (starfish, molluscs and echiurans) disappear from areas where king crabs have been present for a long time. This gives small, rapidly growing species more chance of surviving and breeding, thus altering the structure of the benthic community. In addition, space becomes available for other, more opportunistic species.

The red king crab is a valuable resource, but there is now growing concern about the fact that it is an alien species. Extensive research on its ecological impacts has been started, and a white paper is being drawn up on management of the species in Norwegian waters.

Freshwater ecosystems

Norwegian freshwater ecosystems typically contain few species. In Western Norway, there are generally only two to four fish species in rivers and lakes. It is important to protect such rare species-poor ecosystems. Measures must therefore be taken to prevent the further spread of alien freshwater species in these ecosystems and to eradicate alien species that have already become established. This is particularly important with respect to species that have the potential for further dispersal. The spread of minnows and other members of the carp family such as the common carp, goldfish (*Carassius auratus*), roach (*Rutilus rutilus*), belica (*Leucaspius delineatus*), tench (*Tinca tinca*) and rudd (*Scardinius erythrophthalmus*) is a particularly serious problem. Some other species such as pike, perch and lake trout (*Salvelinus namaycush*) are also spreading rapidly.

Signal Crayfish (*Pacifastacus leniusculus*)

The signal crayfish is an American freshwater crayfish that was introduced to Sweden in 1960. It carries the crayfish plague, a serious fungal disease that has little effect on the signal crayfish but kills the European species, the noble crayfish (*Astacus astacus*). The noble crayfish is listed as endangered in the 2006 Norwegian Red List. The greatest threat to the noble crayfish is the spread of crayfish plague to new rivers with signal crayfish or on fishing gear or boats contaminated with the fungus. Crayfish plague is causing serious problems in two Norwegian river systems, Glomma and Haldenvassdraget. In October 2006, signal crayfish were found in a series of small lakes in a protected landscape near Porsgrunn (Telemark county), and studies showed that the crayfish plague is also present here.

The signal crayfish was introduced to Sweden from the US in 1960. It carries crayfish plague, a disease that has little effect on the signal crayfish but kills the European noble crayfish. Both the signal crayfish and crayfish plague have spread to Norway, and are considered to be the most serious threat to the endangered noble crayfish.
Photo: Jarle Steinkjer

There is also a risk of the introduction of alien aquatic species in connection with imports of live fish for aquaria and ornamental ponds. A North American fish, the pumpkinseed (*Lepomis gibbosus*), was found in some small lakes in Asker west of Oslo in 2005. The species may have been introduced by aquarists or anglers. There are currently no restrictions on imports of fish that are only to be kept in closed aquaria.

Shipping, including ballast water

About 45 alien species are currently established in Norwegian waters. Important pathways of introduction are via hull fouling and ballast water. The risk of introductions rises with the volume of shipping, particularly with transport from areas with a similar marine climate. A warmer climate may increase the likelihood that species introduced from further south will be able to establish themselves in Norwegian waters, and if the Northern Sea Route is opened for traffic, this may increase the risk of introductions from distant areas with a similar marine climate.

Norwegian waters cover some of the most productive marine areas in the world, and Norway has the longest coastline in Europe. The coastal zone is a valuable natural environment in its own right, as well as providing valuable resources and a basis for commercial marine activities. Invasive alien species can have a major impact in both ecological and economic terms.

Ships have to carry ballast water to provide balance and stability, and as a result water is transported from one port to another. At any time, more than 7000 species are in transit in ballast water tanks in ships worldwide. The combination of a large volume of shipping and locally large discharges of ballast water containing alien species means that Norwegian waters are at relatively high risk.

The International Maritime Organization (IMO) adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments on 13 February 2004. The Convention will enter into force one year after at least 30 states that together account for 35% of world merchant shipping tonnage have ratified it. Norway was one of the first countries to ratify the Convention, on 29 March 2007.

Ships' hulls and other surfaces are another pathway for the introduction of alien species, but one that has so far received less attention than ballast water.

New climate – new species

With rising temperatures, it is expected that more southerly species will extend their range to Norway, and others will spread northwards through Norway or perhaps to other countries, without human intervention. Species whose distribution ranges alter as a result of natural or anthropogenic climate change are not considered to be alien species, and this strategy does not apply to them. Nevertheless, it may be necessary for example to monitor certain species that prove to pose a particular threat to commercial activities or environmental assets, and drawn up contingency plans to deal with them. Climate change will also make it more difficult to distinguish between introduced and naturally occurring species.

Hydropower developments and management of river systems

A number of hydropower developments have created new connections within and between river systems, and this in turn has resulted in the dispersal of aquatic organisms. It is difficult to guard against such introductions, for example if fish and small pelagic crustaceans are carried by flowing water. For example, a water transfer scheme (part of a hydropower development) in Nord-Trøndelag resulted in the spread of the opossum shrimp between lakes, and in Hordaland, Arctic char have been transferred from one river system to another as a result of the construction of a pumped storage power plant.

Preventing the spread of alien species is one issue that must be considered when dealing with licence applications for hydropower developments under Norwegian legislation, and has received increasing attention recently. In cases where there is a risk of the spread of invasive alien species, the authorities consider whether to issue orders for preventive measures or refuse the application.

Developers are often required to restock rivers after hydropower developments to compensate for lost fish production. Such measures may have resulted in the spread of unwanted species: for example, there are strong indications that they played a role in the spread of minnows in the 1970s. Previously, fish used to stock rivers came from central facilities, and the fish were not from local populations. The whole stock enhancement system in Norway has now been completely reviewed with a view to conservation of local genetic resources. Fish that are used to stock rivers today are from local stocks.

Regulation of watercourses can result in changes in the species balance and in living conditions in the river, and this in turn may influence how readily organisms that are introduced into the river become established there. Licensees are responsible for revegetation of spoil heaps, tracks, ditches and so on, and alien species are sometimes used for this purpose. The Norwegian Water Resources and Energy Directorate has issued guidelines for revegetation, and recommends allowing vegetation to establish itself naturally or planting/sowing site-specific plant species.

The salmon parasite *Gyrodactylus salaris*

The salmon parasite *Gyrodactylus salaris* is barely visible to the naked eye. It lives on the skin and fins of juvenile salmon, and is considered to be the most serious threat to wild salmon stocks in Norway. Of the 46 Norwegian salmon stocks that have been infected with the parasite, 10 have already become extinct and another 20 are at risk of extinction. The only long-term measure that has proved to be effective against the parasite is its permanent eradication. Fifteen rivers have been chemically treated and are considered to be free of the parasite.

The annual losses caused by *Gyrodactylus* in Norwegian rivers are in the order of NOK 200–250 million, and consist mainly of lost income from salmon fishing in infected rivers, lost income from salmon fishing in neighbouring fjords, and loss of the substantial economic spin-off benefits from salmon fishing. A rough estimate suggests that Norway's losses since the introduction of *Gyrodactylus salaris* 30 years ago are in the order of NOK 3–4 billion.

It has been estimated that eradicating *Gyrodactylus salaris* from all Norwegian river systems indicates will take 12–18 years at a total cost of NOK 340–400 million. Photo: Tor Atle Mo

Many plant species, a number of which were originally introduced as garden plants, are now becoming established in the wild along Norwegian rivers. Some examples are the two introduced hogweeds, Himalayan balsam (*Impatiens glandulifera*), Japanese knotweed (*Fallopia japonica*) and common butterbur (*Petasites hybridus*). These species displace plants that grow naturally along rivers and streams, stabilising the soil and preventing erosion. In contrast to many native plant species, a number of alien species die right back in autumn, leaving open soil. Open soil at times of year when rainfall is high increases erosion, and may result in sediment deposition that smothers fish spawning sites and prey animals.

Transport

The transport sector may contribute to the spread of alien species in the following ways:

- By planting and sowing alien species
- By leaving soil fallow, making it easier for new species to become established
- By mowing verges
- Through earthmoving operations and movement of machinery during construction activities
- By constructing new links (bridges and tunnels) that give access to new species, including predators.

Railways and roads are important pathways of introduction for plants. Many of these cause no problems, but some tend to spread to other habitats where they may displace the natural vegetation. Examples of invasive species found along roads and railways are the two introduced hogweed species, lupins, Canada goldenrod (*Solidago canadensis*)and Japanese knotweed.

Earthmoving, planting and maintenance of green spaces can result in the spread of invasive alien species. In addition, linking islands to the mainland or building roads to other isolated areas can facilitate the spread of species that were not previously found there, and thus change ecological conditions. Species may also be unintentionally spread between river systems when signs and road equipment are washed using water from mobile tanks.

Construction

During the construction of roads, railways and other infrastructure, earthmoving operations may result in the spread of biological material and thus of alien species, damaging natural ecosystems. Excavation, for example of drainage ditches, and other physical disturbance can also make it easier for unwanted species to become established.

Invasion pathways

Links between islands and the mainland can provide access for new animal and plant species. Islands and other areas that have previously been inaccessible to certain species have a species composition that is adapted to this situation. For example, islands without mammalian predators are attractive nesting sites for birds.

Roads can also function as pathways for the introduction of plants. Seeds and other parts of plants may be spread by vehicles, when verges are mown, or during road sweeping or transport of earth or snow.

The presence of open areas with little vegetation is probably the main reason why plants readily spread along railways. Open soil is a suitable habitat for the establishment of alien species. The wind created by passing trains can also help to spread seeds from plants and from the soil. Seeds can also become attached to rolling stock and be transported for longer distances, even across national borders.

A causeway was built to the island of Tautra in Nord-Trøndelag in the 1970s, allowing foxes, badgers and pine martens to reach the island. This is the best-known example in Norway of a road functioning as a pathway for the introduction of species. The predators greatly reduced populations of several bird species on Tautra, which is both a bird reserve and a designated Ramsar site. In 2004, part of the causeway was replaced by a bridge with an electronic gate to prevent predatory mammals from crossing. The lower photo shows the opening of an improved version of the gate in April 2006. The cost of the bridge and gate was about NOK 40 million. Photos: Per Gustav Thingstad

Vegetation

The vegetation on road verges is often a pioneer community, where there a larger numbers of invasive species than elsewhere. Annual mowing of verges limits growth and thus the spread of alien species, but encourages dispersal in other ways, for example by spreading seed.

Dispersal between river systems

Water is used on unmetalled roads and to wash signs and other road equipment. It is pumped into mobile tanks from lakes and rivers and may be used for various purposes along the roads. In this way, water taken from an infected river can end up in a different river. This can spread organisms such as *Gyrodactylus salaris*, crayfish plague and Canadian pondweed from one river system to another.

The defence sector

Annual exercises are held in Norway involving foreign troops, and in this connection both materiel (including vehicles) and personnel cross the border. This could result in dispersal of alien species, although so far no cases where undesirable species have spread across the border have been linked to military activity in Norway. In addition, Norwegian personnel operating abroad could unintentionally introduce species from Norwegian ecosystems to other countries or bring alien species with them when they return to Norway. Imports of materiel also entail a risk of the introduction of alien species to Norway. These risks apply to all branches of the Armed Forces. However, the Norwegian Defence has issued instructions for movements of military materiel and personnel into and out of Norway, and these are presumed to reduce the likelihood of spreading alien species across national borders to a minimum.

Activities of the Armed Forces and movements of materiel can also spread species within the country. For example, the salmon parasite *Gyrodactylus salaris* can be spread by contact with water from infected rivers and lakes. Where information on such threats is available, relevant restrictions are as far as possible indicated on maps for exercises and in instructions for how areas may be used.

In cases where activities of the Armed Forces cause environmental damage, restoration measures may be appropriate. Earthmoving and the use of seed mixtures and plant material in revegetation entail a risk of the spread of alien species.

There is a risk of the spread of alien species via ballast water from certain types of military vessels. Some military bases have treatment facilities for substances such as oil products and heavy metals. However, it has not been adequately assessed whether the existing systems are also satisfactory for the destruction of alien species. This is particularly important in connection with international exercises. At present Norway does not have good routines and effective systems for treatment of ballast water from military vessels during such exercises.

Travel and tourism

Travel and tourism is the world's third largest industry, and one of the fastest growing. It is also the third largest industry in Norway. Travel can be divided into tourism (leisure and recreational travel), business and official travel, and travel to courses and conferences. Travel and tourism is a generic term for businesses in which sales to travellers make up a large share of production.

Nature itself has been identified as one of the most important selling points for the travel and tourism industry in Norway (2005 *Action Plan for the Travel and Tourism Industry*). Since nature is such an important element of the Norwegian tourism product, it is crucially important to adapt activities to the natural and cultural environment. Knowledge of sustainable use is needed as a basis for conservation and development of the resources on which the industry is based.

Information – an important tool

Information is an important tool in efforts to prevent the introduction of invasive alien species. Here, a German tourist is reading information about the salmon parasite *Gyrodactylus salaris* and the precautions that are needed to prevent it from being spread with fishing gear, water containers, and so on.
Photo: Gry Ingebrigsten/Stabbursnes Nature House and Museum.

Globally, travel and tourism is considered to be an important factor in the spread of alien species. This is presumably true of travel and tourism in Norway as well. We know of several alien species that may have been brought to Norway by tourists. For example, two freshwater fish species – gudgeon (*Gobio gobio*) in the river Numedalslågen and belica in Aust-Agder county – were probably introduced by foreign anglers for use as live bait. Both species are farmed and sold commercially as bait in central Europe. The use of live fish as bait is prohibited by the Prevention of Cruelty to Animals Act in Norway, but is permitted in neighbouring countries and many other countries in Europe.

Travel and tourism can also result in the further spread of already established alien species in Norway. The salmon parasite *Gyrodactylus salaris* and crayfish plague can be spread between rivers with damp fishing gear (including clothing, footwear, boats, water containers, and so on). This is why equipment that has been used in an infected river must be disinfected before use in another river.

Under the Convention on Biological Diversity, Norway has also undertaken to provide information on alien species that cause damage in the Norwegian environment, and that tourists should not bring into the country. Examples of such species are crayfish plague, lupins and Japanese rose. In Svalbard, the Arctic fox (*Alopex lagopus*) carries rabies, and both Arctic foxes and the vole *Microtus rossiaemeridionalis* carry the tapeworm *Echinococcus multilocularis*, which can cause fatal disease in people. Tourists who will be spending time ashore in the archipelago are informed of this.

Health

In some cases, invasive alien species can be a direct threat to human health as well as to biodiversity. For example, the two alien hogweed species displace other species and are thus a threat to biodiversity, but also cause serious skin burns and are thus a threat to human health. Alien species such as parasites and bacteria that are spread with people (for instance by intercontinental travel) are not generally a threat to biodiversity. However, alien species that are a health hazard and species that are harmful to biodiversity may follow the same invasion pathways. The spread of organisms with discharges of untreated ballast water from ships is a particularly relevant example. Even though disease control and the purely health-related impacts of invasive alien species are not included in the scope of this strategy, there are areas of overlapping responsibility where cooperation between the health sector and other

sectors on measures to prevent the introduction and spread of invasive alien species should be encouraged and further developed.

Svalbard

The environment in Svalbard is particularly vulnerable. A typical characteristic of ecosystems in Svalbard and other areas in the High Arctic is that they are species-poor, but that many of the species occur in very large numbers. Such ecosystems are especially vulnerable to alien species, which may change them dramatically. Several species have been introduced intentionally, for example the muskox (*Ovibos moschatus*), mountain hare (*Lepus timidus*), the mainland subspecies of reindeer (*Rangifer tarandus tarandus*) and trout (*Salmo trutta*). In addition, species such as the vole *Microtus rossiaemeridionalis* have been introduced unintentionally. This vole species does not occur in mainland Norway, and it carries the tapeworm *Echinococcus multilocularis*, which can cause fatal disease in humans.

All researchers and anglers in Svalbard are required to disinfect any equipment that could represent a risk of the introduction of alien species. Fishing licences set out this requirement clearly, and the authorities will impose sanctions in cases of non-compliance. All sampling equipment must also be disinfected before use at new localities in Svalbard.

If rising temperatures and ice-melt open up new transport routes between Europe and Asia, the risk that marine species will be spread between sea areas in the north may rise. Ecosystems around Svalbard may also be affected by alien species that spread northwards after they are introduced into waters further south. Moreover, there is a certain risk that alien species will be introduced to Svalbard via ballast water carried by cargo and cruise ships. The volume of shipping calling at Svalbard is growing, and this trend is expected to continue.

Species could also be introduced from Svalbard to the mainland, and it is particularly important to maintain a focus on the rabies virus, which is present in Svalbard but not in mainland Norway.

Local responsibility

The municipalities have been assigned a very important role in efforts to achieve Norway's national environmental targets and meet its international commitments. They are responsible for land-use management, and are expected to use the national targets for biodiversity as a basis. In addition, they are responsible for the conservation of biodiversity of regional and local importance.

The municipalities have the authority to make decisions pursuant to the Planning and Building Act and other legislation. Good, integrated management of biodiversity requires cooperation across disciplines and often across administrative boundaries.

A number of municipalities have been taking action to contain, control and eradicate invasive alien species for many years. They have gained valuable experience and expertise that can be very useful in planning and carrying out similar measures in other municipalities and larger regions.

In Oslo, the Agency for Outdoor Recreation and Nature has carried out a survey of alien plant species. Such species were found to be a serious threat in at least 72 (12%) of the most valuable areas of natural habitat in Oslo. There have already been substantial changes in the flora at several localities. In recent years, the municipality has allocated considerable resources to containing and controlling alien plant pests. One of these is the pale swallow-wort (*Vincetoxicum rossicum*). This species has recently been expanding almost explosively on the island of Hovedøya and in several other areas of great botanical interest in the inner Oslofjord, and now poses a serious threat. For the last few years, the Agency for Outdoor Recreation and Nature, the county governor's office and the Directorate of Public Construction and Property have therefore combined forces to organise intensive efforts to remove pale swallow-wort from selected priority localities.

Pulling up pale swallow-wort on Hovedøya island. Photo: Bård Øyvind Bredesen

The Agency is also drawing up principles to be followed when planting areas to ensure that municipal activities do not help to introduce and spread pest plants. The principles will be supplemented with a black list of plants that must not be used and a "wish list" of recommended plants.

Volunteers digging up giant hogweed. Photo: Ski municipality

Giant hogweed is an invasive species in many municipalities, especially in the counties of Oslo, Akershus, Buskerud and Østfold. It is also spreading round Lake Mjøsa, along the coast of Southern Norway, in Western Norway and in Central Norway. In North Norway, it has only been found in Tromsø. Since 2003, Ski municipality south of Oslo, like several other municipalities around the Oslofjord, has been registering the occurrence of giant hogweed. Owners of land where giant hogweed is recorded are contacted and asked to remove the plants. This has resulted in concerted efforts by schools, individual, farmers, local businesses and the Norwegian Public Roads Administration. The municipality hires a consultant each year to organise the removal of giant hogweed from municipal properties and to follow up private property as necessary. Oslo has chosen a slightly different strategy for this species, involving cooperation between various municipal and central government agencies.

CHAPTER 5: INTERNATIONAL AGREEMENTS AND COMMITMENTS

This chapter gives a brief introduction to relevant agreements and guidelines. More details can be found on the websites of the various agreements.

Conventions and other instruments for the conservation of biodiversity

The Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats). Article 11 2(b) requires all parties "to strictly control the introduction of non-native species". The *European Strategy on Invasive Alien Species* has been drawn up under the Convention. The Kyiv Resolution on Biodiversity adopted at the Fifth Ministerial Conference "Environment for Europe" in 2003 sets the target that at least half of the countries of the pan-European region will have implemented the strategy by 2008.

The Bonn Convention on Migratory Species. Article III 4(c) lays down that parties that are Range States of a migratory species listed in Appendix I are to endeavour "to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species."

The UN Convention on the Law of the Sea is a global agreement that regulates navigation and economic activity on the high seas and the rights of coastal states in their own waters. Article 196(1) includes a provision requiring states to take all measures necessary to prevent, reduce and control the introduction of alien or new species that may cause significant and harmful changes to the marine environment.

The UN Convention on Biological Diversity. According to Article 8 (h), Norway must, as far as possible and as appropriate, "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species."

- **Decision VI/23 (Guiding principles on alien species that threaten ecosystems, habitats or species)**, adopted at the sixth Conference of the Parties under the Convention in The Hague, sets out guidelines for developing effective strategies to minimise the spread and impact of invasive alien species. These are further discussed in Chapter 7.3.

International Convention for the Control and Management of Ships' Ballast Water and Sediments (International Maritime Organization, IMO). The ultimate goal of this agreement is to eliminate the risk that invasive alien species will be introduced via ballast water. To begin with, ships must meet certain standards for ballast water exchange, but later they will have to meet performance standards for ballast water treatment. Requirements for ballast water treatment will be phased in the period 2009–2016. The Convention was adopted in February 2004, but will not enter into force until one year after at least 30 states that together account for 35% of world merchant shipping tonnage have ratified it.

OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. This convention dates from 1992, and is the most important regional instrument for developing marine nature management in the North-East Atlantic. Its Annex V on biodiversity entered into force in 2000. This authorises the OSPAR Commission to draw up measures for the control of human activities in order to protect ecosystems and biodiversity in the area. A ballast water strategy for the OSPAR area is being prepared.

The Ramsar Convention on Wetlands provides a framework for the protection and sustainable use of wetlands. Resolution VII.14 from 1999 on invasive species and wetlands urges each party to prepare "an inventory of alien species in wetlands and to assess them so as to identify and prioritise those which pose a threat to wetlands and wetland species." The parties are also urged to review existing law and where necessary to adopt legislation to prevent introductions.

International Plant Protection Convention (IPPC). Its purpose is to secure common and effective action to prevent the spread and introduction of plant pests. Although it primarily deals with plants and plant products that are traded internationally, it also applies to other objects and materials that may spread plant pests, such as soil and packaging. Its covers all plants (cultivated plants, forest, wild plants) and both direct and indirect damage. To protect the world's ecosystems and prevent the loss of biodiversity as a result of invasive alien species, the IPPC cooperates closely with the Convention on Biological Diversity.

The Convention is deposited with the FAO. The text of the Convention was revised in 1997 to bring it into line with the WTO Agreement on Sanitary and Phytosanitary Measures. International standards for phytosanitary measures are developed under the IPCC.

The International Council for the Exploration of the Sea (ICES) is the organisation that coordinates and promotes marine research in the North Atlantic. One of its publications is the *Code of Practice on the Introductions and Transfers of Marine Organisms*. This sets out comprehensive procedures for risk assessment, approval and contingency planning for eradication in the event of unintentional introductions.

The World Conservation Union (IUCN) has prepared *Guidelines for the Prevention of Biodiversity Loss caused by Alien Invasive Species***,** which were approved in February 2000. The IUCN is an international conservation network whose member organisations include states, government agencies and NGOs.

Trade regimes and border controls

The WTO and the GATT Agreement. Article XI of the General Agreement on Tariffs and Trade (GATT) sets out a general prohibition on restrictions on import and export. However, this must be considered in conjunction with the exceptions set out in Article XX, which permits such restrictions if they relate to the conservation of exhaustible natural resources, which is understood to include endangered species and animal and plant life and health. The exceptions may only be invoked if the measures

are not disguised restrictions on international trade or applied in a way that would constitute arbitrary or unjustifiable discrimination between countries.

The WTO Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) ensures that member states are able to take measures and set standards at national level to protect human, animal or plant life or health. Each country may determine the level of protection it considers appropriate, taking into account the effects on trade, and may implement the measures necessary to achieve this level of protection. Such measures must be based on scientific risk assessments and must as a general rule conform to relevant international standards (standard-setting organisations are the Codex Alimentarius Commission, the OIE and the IPPC). Countries may introduce measures that give a higher level of protection than the international standards, but these measures must be based on scientific risk assessments or a substantiated need for a high level of protection. The agreement requires any measures introduced to be non-discriminatory.

According to Article 5(7) of the SPS Agreement, a country may adopt temporary "precautionary" measures if the scientific evidence available is insufficient. In such cases, measures must be based on the information that is available. After adopting temporary measures, a country must seek to obtain the necessary information so that it can carry out a more objective risk assessment within a reasonable period of time.

Agreement on the European Economic Area (EEA Agreement). The 9th recital of the preamble makes it clear that the agreement is intended "to preserve, protect and improve the quality of the environment and to ensure a prudent and rational utilization of natural resources on the basis, in particular, of the principle of sustainable development, as well as the principle that precautionary and preventive action should be taken."

- Article 1(2)(f) states that the objectives of the EEA Agreement are to be attained, among other things, by closer cooperation in the environmental field.
- Articles 11 and 12 prohibit quantitative restrictions on imports and exports and all measures with equivalent effect.
- Article 13 lays down that the provisions of Articles 11 og 12 "shall not preclude prohibitions or restrictions on imports, exports or goods in transit justified on grounds of [...] the protection of health and life of humans, animals or plants", provided that such prohibitions or restrictions do not "constitute a means of arbitrary discrimination or a disguised restriction on trade between the Contracting Parties." The use of such measures has been accepted a number of times in case law.

Annex I to the EEA Agreement on veterinary and phytosanitary matters. The scope of this annex includes imports of animals and animal products. The control routines set out in the annex will to some extent also reveal the presence of invasive alien species.

World Organisation for Animal Health (OIE)
The OIE was established to prevent the spread of animal diseases through international trade. The organisation draws up guidelines for the minimum requirements that should apply to imports of animals (both terrestrial and aquatic) and animal products. These can facilitate international trade by harmonising the response

to particular animal diseases. The OIE's mandate also includes animal welfare and the development of a standard for veterinary laboratories. Norway is one of the 167 member countries of the OIE. The development of rules for trade in animals and animal products in the EEA and the WTO is to a large extent based on the OIE's standards, and it is therefore important for Norway to play an active part in the development of standards and health codes within the organisation.

Other relevant agreements

Convention for the Conservation of Salmon in the North Atlantic Ocean. In 1994, a resolution was adopted under the Convention to minimise impacts from salmon aquaculture on wild salmon stocks. This gives detailed recommendations on measures to minimise escapes of farmed salmon and the spread of salmon diseases and parasites.

The **North Atlantic Salmon Conservation Organisation (NASCO)** is an international organisation established under Article 3 of the Convention for the Conservation of Salmon in the North Atlantic Ocean.

As this chapter shows, many different international and regional agreements are relevant when dealing with alien species. To help countries to implement multilateral environmental agreements more effectively, the United Nations Environment Programme (UNEP) is developing a website that collects together all decisions and requirements relating to selected issues. It deals both with agreements that are the responsibility of environmental authorities and with relevant agreements in other sectors, and thus gives a complete overview of countries' commitments across sectors.

Invasive alien species is one of the issues dealt with on the website. We expect the site to be a useful tool for the implementation of Norway's strategy on invasive alien species.

Norway has provided financial support for development of the website and has been a pilot country during the test phase for the system.

The website is still being developed and can be found at: www.svs-unepibmdb.net

CHAPTER 6: NORWEGIAN LEGISLATION

There is currently no general framework in Norwegian law governing the introduction of alien species and covering all sectors. However, a draft Act on the protection of the natural environment, landscape and biological diversity has been put forward (Official Norwegian Report 2004:28).

Various acts and regulations mention the introduction of alien species, but these have not primarily been adopted to address the problems relating to potentially invasive alien species. Norwegian legislation that currently applies to alien species is briefly discussed below.

The **Aquaculture Act** (Act of 17 June 2005 No. 79 relating to aquaculture) replaces earlier acts on fish farming and sea ranching, and governs all aquaculture activities, including those that are land-based. To ensure that aquaculture facilities are operated in an environmentally sound manner, the act includes a separate chapter on environmental considerations. This authorises the Ministry of Fisheries and Coastal Affairs to lay down further provisions (regulations or individual decisions) to this end, including prohibiting the release of alien species. This has been done in the regulations relating to the operation of aquaculture facilities, which prohibit the farming of alien species unless a special licence has been obtained. In the regulations on the allocation, alteration and withdrawal of licences for farming other species than salmon, trout and rainbow trout, the prohibition is absolute: the regulations state that licences to farm alien organisms may not be granted. The regulations relating to sea ranching also lay down that licences may only be granted for the release of indigenous organisms for the purpose of sea ranching.

The **Animal Welfare Act** (Act of 20 December 1974 No. 73 relating to animal welfare) applies to live mammals, birds, toads, frogs, newts, reptiles, fish and crustaceans. It prohibits the use of live animals for bait. In 1977, regulations were laid down under the act prohibiting imports and sales of exotic animals and holding them in any form of captivity. In 2002, a white paper on the keeping of animals and animal welfare was published. This proposed a review of the Animal Welfare Act with a view to developing a modernised and more appropriate administrative framework for animal welfare. The Ministry of Agriculture and Food, in cooperation with the Ministry of Fisheries and Coastal Affairs, has completed a full review of the act and is preparing a new draft act. A public consultation will be held on the proposed legislation.

The **Act relating to the regulation of imports and exports** (Act of 6 June 1997 No. 32). On 7 March 2006, the Ministry of Foreign Affairs issued regulations delegating the authority to regulate imports of terrestrial invertebrates under this Act to the Ministry of the Environment. This act provides the legal authority for the regulations implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which is also relevant to alien species.

The **Act relating to salmonids and freshwater fish, etc.** (Act of 15 May 1992 No. 47) regulates imports of all types of anadromous salmonids, freshwater fish, eggs and

fry of such fish and animal species eaten by such fish. In December 1992, regulations were laid down extending the scope of the Act to include all freshwater organisms, including salmonids for use in fish farming. Organisms that are to be kept exclusively in aquaria are excepted from the import prohibition. The act also regulates the release of anadromous salmonids, freshwater fish and live eggs and fry of such species to watercourses, fjords or the sea, and releases of other live organisms, including algae and other plants, to watercourses. Under regulations issued in 1993, restrictions on releases to watercourses apply to all freshwater organisms. The transfer of anadromous salmonids from hatcheries to seawater cages is not regulated by this act, but by the Aquaculture Act. However, their release to fjords and the sea for the purpose of commercial sea ranching is regulated by the Act relating to salmonids and freshwater fish.

The **Food Act** (Act of 19 December 2003 No. 124 relating to food production and food safety, etc.) applies to all factors pertaining to the production, processing and distribution of intermediate inputs at the level of primary production and of food. It also applies to all factors pertaining to plant and animal health, including products, articles and organisms that may spread infection. Various regulations issued pursuant to the Food Act or to earlier legislation that it has replaced are important in regulating the introduction of alien species, for example regulations relating to biological control organisms, to seeds, plants and measures against plant pests, to pesticides, and to inspection and control of imports and exports of live animals.

The Food Act lays down a duty of due care to avoid any risk of the development or spread of plant pests. Plants must not be placed on the market or moved if there is reason to suspect the presence of plant pests that may have substantial social impacts. The act also specifies that firms and individuals have a duty to provide notification if there is reason to suspect the presence of intermediate inputs that may be harmful to the environment or of plant pests that may have substantial social impacts.

Serious animal diseases and pathogenic agents and serious plant pests can have major consequences for society. One important way of limiting these impacts is to ensure that individuals who through no fault of their own are affected by such diseases or pests can notify the authorities without risking financial ruin. Rapid notification makes it possible for the authorities act quickly to limit any damage. The Ministry of Agriculture and Food has therefore introduced a compensation system, which is set out in the Food Act.

The **Nature Conservation Act** (Act of 19 June 1970 No. 63 relating to nature conservation) was adopted primarily to protect Norwegian nature, and it does not contain specific provisions on the introduction of alien species. However, regulations establishing protected areas generally include a prohibition against sowing and planting plants or releasing animals, including alien species. A new Act on the protection of the natural environment, landscape and biological diversity is being drawn up to replace the Nature Conservation Act and other legislation. The draft Act was published in Official Norwegian Report 2004:28.

The **Product Control Act** (Act of 11 June 1976 No. 79 relating to the control of products and consumer services) applies to the production, including testing, and the import, marketing, use and other handling of products. The term “product” has been

interpreted to include products that consist of or contain live microorganisms. In January 1998, regulations relating to the declaration and labelling of microbiological products for applications that may involve their release to the external environment were laid down under the act.

The **Seawater Fisheries Act** (Act of 3 June 1983 No. 40 relating to Seawater Fisheries, etc.) primarily regulates the harvesting of marine species, but it also contains a general prohibition against releasing organisms or live roe in fjords and marine areas. The Ministry of Fisheries and Coastal Affairs may give issue regulations or make individual decisions permitting the release of certain organisms or releases in specific areas. A new Marine Resources Act is being drawn up to replace the Seawater Fisheries Act. A draft was published in Official Norwegian Report 2005:10, and a public consultation has been held. The Marine Resources Act will apply to all marine organisms that are found in the wild. The committee that drew up the draft act proposed that the prohibition against releasing organisms should not be retained, because the draft Act on the protection of the natural environment, landscape and biological diversity contains provisions on releases of alien species and genetically modified organisms to the environment both on land (including river systems) and to the sea.

The **Maritime Safety Act** (Act of 16 February 2007 No. 9) entered into force on 1 July 2007, and replaced the Act of 9 June 1903 No. 7 relating to State Control of the Seaworthiness of Ships. It provides the legal authority to lay down regulations on measures to reduce the risk of the introduction and spread of alien species from ships' ballast water and sediments.

A new **Forestry Act** (Act of 27 May 2005 No. 31 relating to forestry) entered into force on 1 January 2006, replacing the 1965 Forestry Act. Regulations pursuant to the new act now include the 1996 regulations relating to forestry seeds and plants. The purpose of these regulations is to ensure that good-quality seeds and plants are used, and that genetic diversity in forests is safeguarded. The material used must be as closely adapted to the climate as possible, and should be of local origin. An approved certificate is required for imports of forestry seeds, plants and parts of plants, and such certificates will only be issued if certain criteria are met. To some extent, these regulations also limit the use of tree species outside their natural range. Such species may only be used if no suitable tree species or provenances are found in the area or another material is considerably better for the purpose in terms of quality or productivity. Regulations on sustainable forestry entered into force on 1 July 2007. These include provisions on environmental considerations, satisfactory regeneration and steps to avoid damage to forests. They also entail somewhat stricter control of the introduction of alien tree species than the Living Forests standard for sustainable forest management in Norway. Under the regulations, the municipalities have the authority to decide whether such species may be used in forestry, and must give weight to avoiding the uncontrolled spread of alien species when evaluating applications. This means that if alien tree species are planted, specific measures to prevent their spread must be considered.

The **Svalbard Environmental Protection Act** (Act of 15 June 2001 No. 79 relating to the protection of the environment in Svalbard) lays down strict rules for importing live animals and plants to Svalbard and for releasing and moving organisms.

The **Customs Act** (Act of 10 June 1966 No. 5) makes the customs authorities responsible for ensuring compliance with current provisions on the carriage of goods to and from Norwegian customs territory. The customs authorities have a duty of confidentiality, but may nevertheless provide information if this is authorised by other legislation. Enforcement of the Customs Act and regulations is important in the context of alien species, since alien species may be intentionally or unintentionally transferred with imports and exports of goods (including means of transport) and movements of people.

The **Wildlife Act** (Act of 29 May 1981 No. 38) includes provisions regulating the introduction of wildlife to Norway and the release of species or subspecies that do not already occur in a district. Wildlife is defined as meaning all wild species of terrestrial mammals, birds, amphibians and reptiles.

CHAPTER 7: GOALS AND PRINCIPLES

This chapter describes the goals and basic principles of the Norwegian authorities' efforts to deal with alien species.

Goals

Strategic objective for conservation and sustainable use of biological diversity:
The environment shall be managed in a way that maintains the diversity of habitats and landscape types and ensures that there are viable populations of naturally-occurring species, thus ensuring that biological diversity can continue to evolve. In addition, Norway aims to halt the loss of biodiversity by 2010.

National target:
The spread of organisms that do not occur naturally in ecosystems as a result of human activity shall not damage or limit ecosystem functions.

Working goal:
To prevent the unintentional introduction of alien species and prevent intentional introductions from having negative impacts through improvement of the legislation, a programme of measures, information and cross-sectoral cooperation.

Basic principles

The following principles will be used as the basis for Norway's management of alien species. They will be applied within the framework of national law and taking into account existing international law, for example the international trade regime.

Precautionary principle *(see the 1992 Rio Declaration, principle 15)*
The precautionary principle is a basic principle of both international and Norwegian law. It is set out in the 1992 Rio Declaration on Environment and Development, where it is expressed as follows: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". The precautionary principle has since been incorporated, worded in different ways, into a number of multilateral environmental agreements.

The impacts of the introduction of alien species on biodiversity, ecosystem functions and the health of domesticated species of animals and plants are highly unpredictable. This means that the authorities should take a precautionary approach in their efforts to prevent unintentional introductions and in decisions on intentional introductions.

Ecosystem approach *(see CBD COP 5 decision V/6)*
The ecosystem approach is a strategy for the integrated management of land, water and living resources. This is a wide-ranging concept, but its essence is that human activity must be managed so that ecosystem structure, functioning, diversity and productivity are conserved as far as possible. Activities that entail a risk of the introduction and spread of alien species must be evaluated as part of the ecosystem approach.

Sectoral responsibilities *(laid down in Norwegian policy documents)*
All sectors of society and actors have an independent responsibility to integrate environmental considerations into their activities. This responsibility also applies to activities that may result in the introduction and spread of alien species and populations.

User-pays principle *(see the 1992 Rio Declaration, principle 16: also set out in Norwegian policy documents)*
This is a variation of the polluter-pays principle, which when applied to alien species means that the person or entity responsible must meet the additional costs of measures to prevent the introduction of alien species and will be liable for the costs of any environmental damage caused by introductions. However, this does not preclude the use of public funding in certain cases to prevent or mitigate environmental damage. For example, public funding may be provided for measures that benefit society as a whole or if the authorities decide to carry out important environmental measures that would put an unreasonable burden on private actors or would be too difficult for them to carry out. However, public funding must not be provided in a way that exempts people or entities from their duty to exercise due care.

Raccon dog (*Nyctereutes procyonoides*),

The raccoon dog is native to eastern Siberia, Korea, Japan and China. In 1928, it was introduced to the former Soviet Union and neighbouring Eastern European countries to increase the number of fur-bearing game species. Over a 25-year period, about 9100 animals escaped or were released from captivity. The raccoon dog became established in Finland in 1935 and reached Sweden in 1945–46, and has now colonised about an area of about 1.4 million square kilometres in Europe. In certain areas, such as Finland and the Baltic states, it has become the most numerous predator. The raccoon dog is omnivorous and takes a wider range of prey than other predators. It can have a particularly severe impact on bird populations in wetlands.

The first confirmed record of the raccoon dog in Norway is from 1983, when a dead animal was found near Kirkenes in Finnmark county. The photograph shows the fourth confirmed find, a raccoon dog that was killed by a car in Skibotn in Troms county in February 2007. So far, there is no evidence that the species has become permanently established in Norway or Sweden.

The raccoon dog is considered to be an undesirable species in Norway. This is both because of the risk that it may spread parasites and disease, and because it may cause severe damage to ground-nesting bird populations. The Directorate for Nature Management has therefore decided that raccoon dogs may be shot at any time of year. Possible observations of the species should be reported to the authorities.
Photo: Heidi Hansen

Guidelines relating specifically to alien species

The principles underlying Norway's management of alien species are described below. They are based on the guiding principles for the implementation of Article 8 (h) of the Convention on Biological Diversity and the principles of Norwegian environmental policy.

Three-stage approach

1. Prevent the introduction of invasive alien species
Prevention is generally more cost-effective and environmentally desirable than measures to suppress or control already established alien species.

Prevention includes the following:

- **General measures:**
  - Border control and quarantine measures to ensure that intentional introductions are authorised under the relevant legislation, and to reduce the risk of unintentional or illegal introduction of alien species.
  - Information – including the exchange of information between countries and information to relevant authorities and the general public on invasive alien species, the problems they may cause, and the measures that can be taken to prevent introductions and to contain and control or eradicate alien species.
  - Cooperation within and across national borders, for example on information activities, research and capacity-building in countries that do not have the necessary expertise and resources.
- **Restrictive legislation on intentional introductions.** Intentional introductions must only be permitted with prior authorisation under legislation designed as far as possible to prevent damage as a result of the introduction and spread of alien species.
- Possible pathways of **unintentional introduction** must be identified and measures must be introduced to minimise the risk of such introductions. Each sector has a special responsibility for its own activities.

2. Eradicate alien species
Where it is feasible, eradication is often the appropriate response. The best opportunity for eradicating invasive alien species is in the early stages of invasion, while their populations are small and localised. It is therefore a goal to detect new alien species in the environment as early as possible, and to act rapidly.

3. Contain and control alien species and monitor their populations
If eradication is not appropriate or possible, measures to contain alien species (limit their spread) or control them (limit the damage they cause) should be taken. Monitoring should be used to evaluate the efficiency of the measures implemented.

Norway's responsibilities to other countries
The risk that invasive alien species will spread from Norway to other countries is to be minimised. This responsibility applies both to intentional and unintentional introductions of alien species to other countries, and to secondary introduction to other countries as a result of intentional introduction of a species to Norway. Norway must also provide authorities in other countries with early warnings of the occurrence or increasing populations of potentially invasive alien species.

Research, surveys and monitoring
Research, surveys and monitoring are an essential basis for building up adequate knowledge about the distribution of naturally occurring and alien species, how they affect their surroundings, and how they can be eradicated, contained or controlled.

Information and awareness-raising
It is important to provide information and raise public awareness of the risks associated with alien species, both as a means of reducing risk and in order to create understanding and acceptance of the measures that need to be taken to reduce the spread of alien species.

CHAPTER 8: PROGRAMME OF MEASURES

Efforts by the authorities to address the problems of invasive alien species will be based on the goals, principles and guidelines described in Chapter 7.

The administrative sectors involved have drawn up the lists of measures, which describe what should be done in the short term to prevent alien species from causing damage to health and the environment. The document focuses on new measures and does not describe activities and measures that have already been carried out and completed.

Different sectors are involved with the problems associated with alien species in different ways, and the need for specific measures will vary. Regardless of this, however, a joint approach and cooperation between sectors are necessary. The next section of this chapter describes joint measures involving several sectors. Sections 8.2 to 8.11 describe measures to be taken by individual sectors, and assign a level of priority (low, medium, or high) to each of them. They also indicate whether cooperation between two or more sectors is needed for each of the measures listed.

The Ministry of the Environment has the overall responsibility for ensuring environmental policy coherence, and will therefore play a leading role and be responsible for following up the measures listed in this strategy vis-à-vis other sectoral authorities.

Joint measures

Development of legislation

- By 2010, all sectors are to have adequate and appropriate legislation relating to the intentional introduction of alien species, to prevent undesirable introductions and the spread of invasive alien species. This will include clarification of the rules for reporting the illegal introduction of alien species and the penalties for such introductions.

  Responsible: all sectors. The Ministry of the Environment has a particular responsibility for the development of general legislation on alien species within the framework of the proposed Act on the protection of the natural environment, landscape and biological diversity.
  Priority: High.

Development of guidelines for risk assessment prior to intentional introductions

- A set of guidelines is to be developed within the framework of existing legislation for risk assessment when applying to introduce alien species intentionally. These will be based on internationally recognised methods of risk assessment, for example as set out in the ICES Code of Practice on Introductions and Transfers of Marine Organisms, and on existing legislation on risk assessment of genetically modified organisms and biological control agents.

Priority: High
Responsible: Directorate for Nature Management, in cooperation with other sectors.

Risk assessment in each sector

- In the course of 2008, each sector is to carry out a risk assessment of the spread of alien species related to activities within the sector, including identification of high-risk activities, evaluation of the risk of the spread of known problem species, and evaluation of the risk that species occurring naturally in Norway will spread to new ecoregions. The Norwegian Biodiversity Information Centre's risk analyses of alien species can be a useful starting point for follow-up by the different sectors..
  Responsible: All
  Priority: High

Measures to deal with already established alien species

- Draw up action plans and implement measures to control, contain or eradicate selected invasive alien species within each sector's sphere of responsibility, based among other things on the ecological risk analyses carried out by the Norwegian Biodiversity Information Centre.
  Responsible: All. The Directorate for Nature Management will assist other sectors to set priorities and evaluate measures.
  Priority: High
- Measures to eradicate, contain or control alien species should be coordinated by relevant actors within geographically delimited areas. The need for priorities and coordination of measures across sectors is to be evaluated for each problem species.
  Responsible: All. The Directorate for Nature Management and the county governors' offices will assist in coordination of measures targeting particular species across sectors and administrative levels.
  Priority: High

Development of early warning systems for alien species that may spread to Norway

- Continue work within the North European and Baltic Network on Invasive Alien Species (NOBANIS) on the development of an early warning system for invasive alien species.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Within the framework of the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention), develop an early warning system for alien marine species.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High

Surveying and monitoring alien species

- Surveys and monitoring of alien species are to be reviewed as part of the national programme to survey and monitor biological diversity. An appropriate survey and monitoring programme for alien species is to be established by 2010. Ways of drawing voluntary organisations (including environmental, fisheries and

agricultural organisations, biological societies, diving clubs, etc.) into practical monitoring activities will be evaluated. This can be a means of detecting the introduction and spread of alien species at an earlier stage.
Responsible: National programme to survey and monitor biological diversity (Ministry of the Environment, Ministry of Agriculture and Food, Ministry of Fisheries and Coastal Affairs, Ministry of Petroleum and Energy, Ministry of Transport and Communications, Ministry of Defence, Ministry of Education and Research).
Priority: High.

Research

- A cross-sectoral research initiative on alien species is needed. Two research programmes under the Research Council of Norway, Environment 2015 and The Oceans and Coastal Areas, will provide a basis for this, but other research programmes and sources of funding will also be identified and used. The initiative should cover a wide range of issues relating to alien species and populations. Building up knowledge about preventive measures and eradication, containment and control, and about the social, ecological and economic impacts of alien species is particularly important. Another important element of the initiative will be to improve understanding of the links between different environmental pressures and land-use changes and the spread and establishment of alien species. Participation in and cooperation with international research programmes will be important for competence-building and will permit a higher level of activity.
  Responsible: All
  Priority: High

Information and awareness-raising

- All administrative sectors are to take active steps to provide information on the risks associated with the introduction and spread of alien species, and the rules relating to their introduction. Information is to focus on target groups involved in activities that can result in the intentional or unintentional introduction and spread of alien species.
  Responsible: All
  Priority: High

Cross-sectoral coordination and competence-building

- Identify activities within the sector where coordination with other sectors is needed to prevent the introduction and spread of alien species, and take the initiative for coordination.
  Responsible: All
  Priority: High
- Identify areas where roles and responsibilities of different sectors as regards the management of alien species are not clearly defined.
  Responsible: All
  Priority: High
- Take steps to ensure regular contacts between sectors involved in the management of alien species for competence-building and exchanging information, including joint meetings.
  Responsible: All, particularly Ministry of the Environment and Directorate for Nature Management

Priority: High

- Establish a national network of experts on alien species from the relevant sectors, and a national database on methods of eradicating, containing and controlling alien species.
  Responsible: Directorate for Nature Management in cooperation with Norwegian Biodiversity Information Centre.
  Priority: Medium
- Develop methods of eradicating, containing and controlling alien species that are as environmentally sound and effective as possible.
  Responsible: All
  Priority: High
- Seek to obtain site-specific seed mixtures and suitable plant material for the establishment of vegetation after habitat disturbance.
  Responsible: Large-scale users of seed mixtures, including the Ministry of Transport and Communications, the Ministry of Defence and the Ministry of Petroleum and Energy.
  Priority: High
- Survey resources and expertise available for eradicating, containing and controlling alien species (including emergency measures), including centres of expertise, voluntary organisations, the school system, military personnel, etc. Consider the establishment of a network of experts and resources for use in emergencies.
  Responsible: Directorate for Nature Management, in cooperation with other administrative sectors.
  Priority: Medium

National and international coordination

- The county governors are to take part in coordination of measures against alien species at regional level, and will provide advice to the municipalities. They may also take the initiative for regional action plans and measures to eradicate, contain and control alien species.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Establish routines for early warning of all relevant administrative bodies in the event of new occurrences of alien species that are expected to cause problems in Norway or if coordinated efforts are required to prevent further spread.
  Responsible: All
  Priority: High
- Establish routines for early warning of authorities in other countries of the occurrence of alien species that can be expected to spread by secondary introduction.
  Responsible: All
  Priority: High

Ministry of Fisheries and Coastal Affairs

The Ministry of Fisheries and Coastal Affairs is responsible for the management of living marine resources and for the fisheries and aquaculture value chains all the way to the consumer. In other words, the Ministry manages both the use of marine resources and the marine environment itself. The precautionary principle and the principle of sustainable development are used as a basis for management activities, and the Ministry has the clear intention of developing an ecosystem-based management system for natural resources. Furthermore, the Ministry is responsible for efforts to ensure that seafood is safe and of appropriate quality, for the aquaculture sector, and for dealing with disease organisms of both wild and domesticated aquaculture species in both freshwater and the sea.

One of the goals set out in the Ministry's environmental action plan for 2005–2008 is to avoid the spread of alien organisms and adverse impacts of such organisms.

This sector will:

- Manage already introduced alien species in accordance with the precautionary principle and international obligations relating to alien species. Activities will include:
    - Preparation of a new white paper on the red king crab, to be submitted in 2007.
      Responsible: Ministry of Fisheries and Coastal Affairs
      Priority: High
    - Evaluation on a continuous basis of measures necessary to deal with other invasive alien species in Norwegian waters.
      Responsible: Ministry of Fisheries and Coastal Affairs
      Priority: High
    - Annual monitoring of the population size and geographical spread of the red king crab along the coast.
      Responsible: Institute of Marine Research
      Priority: High
- Consider the introduction of stricter rules on movements of live marine organisms for consumption across national and regional borders.
  Responsible: Ministry of Fisheries and Coastal Affairs
  Priority: High
- Intensify efforts to prevent the further spread of crayfish plague, with the ultimate goal of eradicating the disease from Norway. The Norwegian Food Safety Authority and the Directorate for Nature Management will draw up a joint management plan for the noble crayfish as one element of these efforts.
  Priority: High
  Responsible: Norwegian Food Safety Authority, in cooperation with Directorate for Nature Management
- Continue efforts to control and contain the salmon parasite *Gyrodactylus salaris* in infected rivers, with the aim of eradicating it where possible.
  Responsible: Norwegian Food Safety Authority, in cooperation with Directorate for Nature Management
  Priority: High

Ministry of Defence

The Ministry of Defence has the overall responsibility for activities in the defence sector, including training and exercises for Norwegian military units, training of Allied troops in Norway, exercises in Norway involving troops from other nations, and Norwegian participation in international operations. The Ministry also has the overall responsibility for managing shooting ranges and training areas, which cover large areas of land in all parts of the country. Furthermore, the Ministry is responsible for the Coast Guard, which is an integrated part of the Armed Forces. One of the Coast Guard's tasks is to control compliance with environmental legislation.

This sector will:

- Take steps to identify activities within the sphere of responsibility of the Ministry of Defence, both in Norway and abroad, that may entail a risk of the spread of alien species.
  Responsibility: Norwegian Armed Forces, Norwegian Defence Construction Service
  Priority: High
- Take steps to prevent the spread of species across national borders in accordance with the instructions for movements of military materiel and personnel into and out of Norway.
  Responsibility: Norwegian Armed Forces
  Priority: High
- Take part in efforts to eradicate, contain and control invasive species within its sphere of responsibility and assist other authorities with such efforts where this is considered to be practicable and appropriate.
  Responsibility: Norwegian Defence Construction Service, Norwegian Armed Forces
  Priority: Medium
- Build up knowledge within the sector of the risk of further spread of alien species within Norway. The purpose is to prevent further spread of invasive species that have already been introduced, and to assess the risk that naturally occurring species will be spread to new ecoregions within Norway.
  Responsibility: Norwegian Armed Forces, Norwegian Defence Construction Service
  Priority: Medium
- Measures to prevent the spread of alien species with ballast water in Norwegian vessels or vessels taking part in operation and exercises in Norway will be specifically evaluated. (Vessels belonging to and being used by the Armed Forces are exempt from the provisions of the Act relating to State Control of the Seaworthiness of Ships. However, the Navy's instructions lay down that all its vessels must, as a minimum, satisfy all relevant civilian requirements. The new Maritime Safety Act, which has been in force since 1 July 2007, replacing the Seaworthiness of Ships Act, does as a general rule apply to vessels belonging to the Armed Forces, although exceptions may be laid down in regulations. The practical and technical consequences must be reviewed before a decision is taken on whether naval vessels are to comply fully with the new provisions on ballast water).
  Responsibility: Norwegian Armed Forces

Priority: Medium

Ministry of Justice, including the Office of the Governor of Svalbard

Investigating and fighting environmental crime is an important task for the Ministry and for the justice sector as a whole. In this area, the police are responsible for prevention and control and for reacting quickly to breaches of the environmental legislation. Serious environmental crime is to be given high priority. The National Police Directorate has drawn up an action plan for fighting environmental crime.

The Norwegian National Authority for Investigation and Prosecution of Economic and Environmental Crime (Økokrim) was established in 1989.

The Governor of Svalbard is the highest authority in Svalbard. The Office of the Governor of Svalbard is a subordinate agency of the Ministry of Justice, but it also carries out tasks for a number of other ministries, including the Ministry of the Environment. Norway's main objective for environmental protection in Svalbard is to is to protect the unique wilderness of the archipelago. Svalbard is to be maintained as one of the world's best managed wilderness areas.

This sector will:

- Safeguard biodiversity by enforcing important legislation and by prosecuting anyone who breaks rules intended to prevent the introduction and spread of alien species.
  Responsible: Chiefs of police, Governor of Svalbard, public prosecutors and Økokrim
  Priority: Medium
- Enforce the strict prohibition on the introduction of new species to Svalbard and investigate and take to court any breaches of this prohibition, in accordance with the Svalbard Environmental Protection Act and on the basis of the precautionary principle.
  Responsible: Governor of Svalbard, in cooperation with Directorate for Nature Management and Directorate of Fisheries.
  Priority: High
- Continue control of dogs to ensure they are vaccinated and that rules for import and export are followed, in order to prevent the spread of the rabies virus from Svalbard.
  Responsible: Governor of Svalbard, in cooperation with Norwegian Food Safety Authority
  Priority: High

Ministry of Agriculture and Food

The main responsibilities of the Ministry of Agriculture and Food are food production, forestry and maintenance of the agricultural landscape and of a viable agricultural sector in all parts of the country. This involves a wide range of tasks and

responsibilities related to farming, forestry, grazing resources and reindeer husbandry. The Ministry's activities are also important for travel and tourism, cultural identity and the food processing industry.

In drawing up food policy, the Ministry considers the entire food production chain from farm to fork. Work in this field is based on the purpose of the Food Act, which is to ensure safe and wholesome food and to promote health, quality and consumer concerns along the whole production chain. Environmental considerations are integrated into food policy, which means that environmental assessments must be made at every stage of the food production chain. Efforts to prevent the introduction and spread of alien species are therefore highly relevant to the agricultural sector.

Responsibility for food policy is shared between the Ministry of Fisheries and Coastal Affairs, the Ministry of Health and Care Services and the Ministry of Agriculture and Food. The Norwegian Food Safety Authority is a subordinate agency of the Ministry of Agriculture and Food, and plays a central role in the implementation of food policy by providing advisory, supervisory and monitoring services along the whole chain of food production, and maintaining an emergency response in this field. The Norwegian Food Safety Authority has the main responsibility for drawing up and administering regulations under the Food Act and the Animal Welfare Act.

This sector will:

- Intensify efforts under current legislation laid down by the Ministry of Agriculture and Food to prevent the spread of specific alien disease organisms from the agricultural sector to wild species and natural ecosystems.
  Responsible: Ministry of Agriculture and Food, Norwegian Food Safety Authority
  Priority: High
- Further develop surveys and monitoring programmes for alien tree species as part of the National Forest Inventory.
  Responsible: Ministry of Agriculture and Food
  Priority: High
- Ensure that the forestry legislation is used to promote great caution as regards use of alien tree species in forestry, and that the municipalities apply the provisions adopted on control of the use of alien tree species.
  Responsible: Ministry of Agriculture and Food
  Priority: High
- Develop safeguards relating to imports of timber and wood products to minimise unintentional introductions of undesirable alien species to the Norwegian environment, for example through control and monitoring of imports and timber terminals.
  Responsible: Ministry of Agriculture and Food
  Priority: High
- Introduce import requirements for wood packaging in accordance with international phytosanitary standards under the IPPC (ISPM No.15) to prevent the introduction of serious forestry pests that may have serious consequences for the industry and constitute a threat to biodiversity.
  Responsible: Ministry of Agriculture and Food
  Priority: High
- Continue efforts to prevent the introduction and spread of animal and plant pests, including invasive alien species that are a threat to biodiversity.

Responsible: Ministry of Agriculture and Food
Priority: High

- In cooperation with relevant authorities, evaluate appropriate measures to prevent the introduction of alien species that are known to be a threat to biodiversity and that are not clearly regulated in the legislation at present.
  Responsible: Ministry of Agriculture and Food, Ministry of the Environment, Directorate for Nature Management, others
  Priority: High
- Take steps to limit or eliminate the use of specific invasive alien species in Norwegian agriculture.
  Responsible: Ministry of Agriculture and Food
  Priority: High
- Ensure that the inspection and enforcement system is effective and clearly targeted.
  Responsible: Ministry of Agriculture and Food, Norwegian Food Safety Authority
  Priority: High
- The goal of the Plant Health and Plant Protection Division of Bioforsk and the National Veterinary Institute is to be important national and international centres of expertise in plant health and animal health (including both domestic and wild animals). They will carry out research and improve efficiency to strengthen the emergency response, diagnostic procedures, monitoring programmes and reference functions in these fields.
  Responsible: Ministry of Agriculture and Food, Norwegian Food Safety Authority, Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Expand information activities relating to the introduction of alien species, targeting relevant industries and society in general. Airports, railway stations and border crossings are particularly important.
  Responsible: Ministry of Agriculture and Food, Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Raise awareness within the sector of its responsibilities under the Food Act.
  Responsible: Ministry of Agriculture and Food, Ministry of the Environment, Directorate for Nature Management
  Priority: Medium
- Promote the use of Norwegian seeds and plant material in forestry, gardens and public spaces.
  Responsible: Ministry of Agriculture and Food, Norwegian Food Safety Authority
  Priority: Medium

Ministry of the Environment

The Ministry of the Environment has the overall responsibility for ensuring environmental policy coherence. To achieve the goal of sustainable development, environmental considerations must be integrated into all sectors of society. In addition to initiating and carrying out measures itself, the Ministry takes initiatives vis-à-vis other government agencies and is responsible for coordinating environmental policy and for performance monitoring in all sectors.

The Directorate for Nature Management is the Ministry's advisory and executive body in the field of nature management. The Directorate maintains a broad overview of the state of the environment and has authority over the county departments of environmental affairs in matters relating to nature management.

This sector will:

- Implement Article 8 (h) of the Convention on Biological Diversity in environmental legislation, among other things through the adoption of the new Act on the protection of the natural environment, landscape and biological diversity, which includes provisions on alien species.
  Responsible: Ministry of the Environment
  Priority: High
- Take initiatives and provide advice to promote the implementation of international obligations relating to alien species in legislation for other sectors.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Play a leading role in the implementation of this strategy, and provide advice to other sectors on its implementation.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Take steps to provide more information on the legislation relating to invasive alien species and the impacts their introduction and spread may have on biodiversity, society and the economy.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Draw up action plans for priority invasive alien species that are the responsibility of the environmental authorities.
  Responsible: Directorate for Nature Management
  Priority: High
- Through the county governors, encourage the implementation and coordination of measures to deal with invasive alien species at regional level.
  Responsible: Directorate for Nature Management
  Priority: High
- Carry out surveys and monitoring of alien species as part of the general monitoring programme for protected areas.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Arrange for systematic removal of alien species as part of the management regime for protected areas. Initially, selected protected areas where alien species pose an acute threat should be given priority.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Draw up regulations relating to treatment of ship's ballast water and sediments in Norwegian ports and waters, with a view to their entry into force in 2007.
  Responsible: Ministry of the Environment
  Priority: High
- Work towards coordinated measures to deal with the environmental threat posed by ships' ballast water, sediments and fouling organisms in the OSPAR area.

Responsible: Directorate for Nature Management, in cooperation with Norwegian Maritime Directorate
Priority: High

- Continue to follow a restrictive line as regards permission to import or release anadromous salmonids, freshwater fish and animal species eaten by such fish to lakes and rivers under the Act relating to salmonids and freshwater fish, and permission to import and release wildlife species under the Wildlife Act. Introduce amendments where there are weaknesses in the legislation, particularly as regards freshwater organisms kept in garden ponds and aquaria.
  Responsible: Directorate for Nature Management
  Priority: High
- Obtain information on the current status of introduced freshwater species such as minnows and other members of the carp family (roach, rudd, tench, common carp, goldfish), perch, pike, lake trout and Canadian pondweed. Initiate surveys, monitoring and other measures to prevent the introduction of species into fresh water.
  Responsible: Directorate for Nature Management
  Priority: High
- Draw on the Norwegian Nature Inspectorate in connection with surveys, monitoring and other measures to deal with alien species.
  Responsible: Directorate for Nature Management
  Priority: High
- Where appropriate, cooperate with voluntary organisations on information activities, surveys, monitoring, and measures to eradicate, contain and control invasive alien species.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: Medium
- Take the initiative for the establishment of formal procedures for cooperation between the environmental authorities and other sectors in areas of relevance to the control and management of alien species.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High
- Encourage research institutions to conduct research on alien species and review measures to eradicate, contain and control them.
  Responsible: Ministry of the Environment, Directorate for Nature Management
  Priority: High

Ministry of Trade and Industry

The Ministry of Trade and Industry is responsible for drawing up a future-oriented business policy that influences all policy areas of importance for value creation.

The Ministry is the main owner of Innovation Norway, which provides products and services intended to promote innovation in business and industry nationwide, foster regional development and profile Norwegian industry and Norway as a tourist destination.

Ballast water is one of the main pathways of introduction for alien marine species. Innovation Norway runs a grant scheme for research and development projects which among other things has been used to support the development of systems for treating ships' ballast water.

This sector will:

- Support the development of technology and activities that can reduce the risk of the introduction of invasive alien species, for example treatment technology for ballast water.
  Responsible: Innovation Norway
  Priority: Medium

Ministry of Petroleum and Energy

The Ministry of Petroleum and Energy is responsible for the oil and gas sector, energy production and supplies, and water resource management, including the protection of river systems.

Within the Ministry's sphere of responsibility, the risk of the spread of alien species is linked particularly to the establishment of new waterways and water transfer schemes, often in connection with hydropower developments.

This sector will:

- Continue efforts to prevent the spread of alien aquatic species by implementing appropriate measures when new water transfer schemes are established..
  Responsible: Ministry of Petroleum and Energy, Norwegian Water Resources and Energy Directorate
  Priority: High
- Ensure that revegetation of spoil heaps, tracks, ditches and so on carried out by licensees as part of hydropower or other development projects along river systems follows the guidelines issued by the Norwegian Water Resources and Energy Directorate. This means that as far as possible, vegetation should be allowed to establish itself naturally or site-specific plant species should be used. Require that when seed mixtures are used, steps are taken to minimise the risk of introducing invasive alien species.
  Responsible: Norwegian Water Resources and Energy Directorate
  Priority: High

Ministry of Transport and Communications

The Ministry of Transport and Communications has the overall responsibility for policy on telecommunications and postal services and on the aviation, road (including ferries that form part of the public road system) and railway sectors. Its subordinate agencies include the Norwegian Public Roads Administration and the Norwegian National Rail Administration. The most important steering documents for Norwegian transport policy are the four-yearly national transport plan and the annual budgets. The Norwegian Public Roads Administration and the Norwegian National Rail

Administration receive annual allocations from the Ministry, together with general guidelines for the use of funds.

This sector will:

- Carry out a risk assessment of the spread of alien species for the transport sector in the course of 2008.
  Responsible: Ministry of Transport and Communications
  Priority: High
- On the basis of the risk assessment and advice from the environmental authorities, draw up action plans and implement measures in the transport sector to deal with selected invasive alien species.
  Responsible: Norwegian Public Roads Administration, Norwegian National Rail Administration
  Priority: High

Measures that may be included in the National Rail Administration's action plan:

- Incorporate preventive measures and measures for eradicating, containing and controlling invasive alien species into routines for planning, design and construction of infrastructure and into operating and maintenance routines for infrastructure in the National Rail Administration's management system.
  Responsible: National Rail Administration
  Priority: High
- Include invasive alien species as one topic in information material and procedures for environmental management programmes. For example:
  - Requirements relating to seed mixtures, plant species, etc. used to establish vegetation
  - Measures to prevent or mitigate adverse effects in areas that are particularly important for biodiversity, such as nature reserves
  - Requirements relating to earthmoving operations
  - Requirements relating to cleaning of machinery.

  Responsible: National Rail Administration
  Priority: High
- Seek cooperation on measures to deal with invasive alien species in specific geographical areas, for example involving municipalities, the Public Roads Administration and the National Rail Administration.
  Examples of relevant issues for such cooperation are:
  - Registering and controlling giant hogweed and other invasive alien species in Eastern Norway. High priority.
  - Preliminary survey to identify the scale of problems involving alien species along the railway network in other parts of Norway.

  Responsible: Cooperation between municipalities, county governors, National Rail Administration and Public Roads Administration
  Priority: Medium

Measures that may be included in the Public Roads Administration's action plan:

- Incorporate preventive measures and measures for eradicating, containing and controlling invasive alien species into routines for the planning and construction of roads and operating and maintenance routines for the road network.
  Responsible: Public Roads Administration
  Priority: High
- Include invasive alien species as one topic in the Public Roads Administration's manuals, guidelines, information material, environmental management programmes, etc., and in contracts. For example:
  - Requirements relating to seed mixtures, plant species, etc. used to establish vegetation
  - Measures to prevent or mitigate adverse effects in areas that are particularly important for biodiversity, such as nature reserves
  - Requirements relating to earthmoving operations
  - Requirements relating to cleaning of machinery.
  - Preventive measures and measures to eradicate, contain and control certain invasive alien species.

  Responsible: Public Roads Administration
  Priority: High
- Building up expertise and raising awareness of the problems associated with invasive alien species within the organisation.
  - Internal courses, seminars, etc.
  - Preparation of information material.

Responsible: Public Roads Administration
Priority: High

Directorate of Customs and Excise (for the Ministry of Finance)

The Directorate of Customs and Excise is a subordinate agency of the Ministry of Finance. It is responsible for preventing illegal imports and exports of goods to and from Norway, and for carrying out a range of controls relating to imports and exports of goods. Another important task is providing information about the rules on imports and exports of goods.

Imports and exports are based on a self-declaration system, meaning that importers and exporters are responsible for providing the correct information. In principle, they must themselves ensure that they comply with all the rules and pay the correct customs duties. It is therefore essential that importers and exporters are familiar with the rules and aware of which goods are or may constitute a threat to the environment.

This sector will:

- Play an important part in efforts to prevent the illegal import of alien species through its wide powers to make checks on imports and exports of goods, and by providing information on the current rules.

Responsible: Directorate of Customs and Excise
Priority: High

- In cooperation with the environmental authorities, build up expertise in the customs authorities on goods and products that may entail a risk of the introduction of alien species.
  Responsible: Directorate of Customs and Excise, in cooperation with Directorate for Nature Management
  Priority: High

Ministry of Education and Research

The Ministry of Education and Research is responsible for sectors of society important to our growth and development, both as individuals and as a society. It is responsible for educational and research institutions that play important roles as cultural agents and purveyors of culture and that generate knowledge that is needed both by the public administration and by society in general.

The Ministry's goal is for Norway to have a good, effective educational system and productive and creative research institutions. Educational and research institutions have an essential role to play in efforts to halt the loss of biodiversity. The spread of invasive alien species is one of the greatest threats to biodiversity. It is therefore important to generate knowledge of the ecological and economic effects of alien species and of effective ways of eradicating, containing and controlling invasive such species. It is also important to communicate information on alien species to schools, research institutions, the general public and the public administration.

This sector will:

- Through basic allocations and allocations from the Research Council of Norway, take steps to ensure that universities and colleges can give priority to research and teaching on alien species.
  Responsible: Ministry of Education and Research, in cooperation with other relevant ministries
  Priority: High
- Use the development of the national curriculum for the Knowledge Promotion Reform and the strategy for education for sustainable development as means of strengthening knowledge of alien species as a threat to the environment.
  Responsible: Norwegian Directorate for Education and Training, in cooperation with Ministry of Education and Research
  Priority: High

Norwegian Biodiversity Information Centre (www.biodiversity.no)

The Norwegian Biodiversity Information Centre was established in 2005, and is located at the Museum of Natural History and Archaeology, which is part of the Norwegian University of Science and Technology. The establishment of the Centre was one of the key steps taken by the Ministry of Education and Research to follow up the white paper on biodiversity (Report No. 42 (2000–2001) to the Storting). The Biodiversity Information Centre is intended to be a national information centre on biodiversity at the level of habitats, species and populations. According to its terms of reference, the Centre is to make work on invasive alien species one of its priorities.

The primary tasks of the Biodiversity Information Centre are to compile and systematise data from other databases, conduct quality assurance, and present information on species and habitats in a form that is easily accessible to the general public and to a wide range of institutions and organisations. These include local government agencies (especially the municipalities), regional and central government agencies, the national environmental authorities, research and higher education institutions, the school system, NGOs and others.

The Biodiversity Information Centre cooperates with the scientific institutions that generate primary data on biodiversity, first and foremost the universities and natural history museums, and is working on coordination of data from these institutions to provide the scientific basis for the products and services it offers.

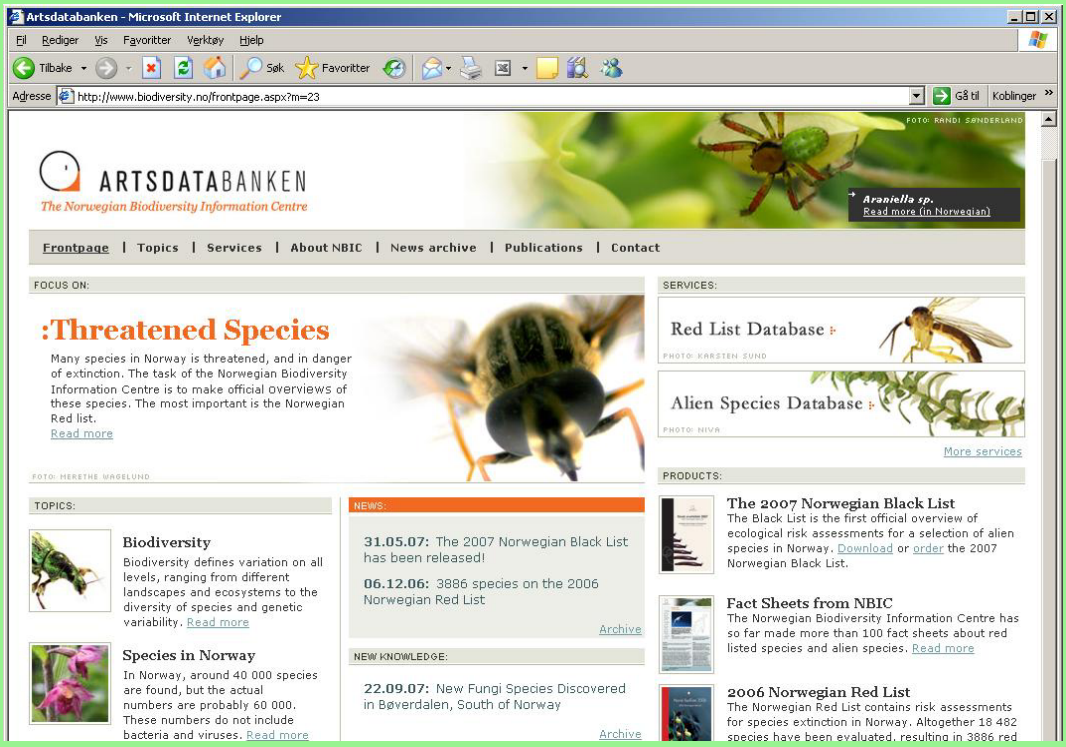
The following resources are so far available from the Biodiversity Information Centre:

- A list of alien species that have been found in Norway (in Norwegian only).
- Fact sheets on selected alien species (in Norwegian only)
- The *2007 Norwegian Black List*, which was published in May 2007. This presents ecological risk analyses of 220 of the alien species that are already established in Norway.
- A database on alien species (FremmedArtsBasen), which is intended as a tool for carrying out ecological risk analyses and presents and provides documentation on those that have already been carried out (in Norwegian only).

The Biodiversity Information Centre has developed these resources in close cooperation with the relevant scientific institutions. They will need to be regularly updated and further developed.

The Biodiversity Information Centre will continue its work on alien species by:

- Maintaining an updated list of alien species that have been found in Norway. Routines for registering information on records of alien species will be developed.
- Continuing and updating ecological risk assessments of alien species (the Black List), and developing a database to provide information on the documentation available on ecological risk.
- Organise the production and updating of fact sheets on alien species in Norway.



CHAPTER 9: ECONOMIC AND ADMINISTRATIVE CONSEQUENCES

The economic costs of invasive alien species can be very high, and include both the costs of the damage they cause and the costs of controlling them. For example, the salmon parasite *Gyrodactylus salaris* has so far cost Norway between NOK 3 and 4 billion, and the South American leafminer *Liriomyza huidobrensis* cost the horticulture industry NOK 40–50 million in 2002. Internationally, there are examples of alien species that have caused far greater losses. By taking preventive measures to avoid the introduction of new species, it is also possible to avoid large direct costs to society in the form of damage in various commercial sectors, losses of biodiversity, and the costs of the short- and long-term eradication, control and containment measures that would be needed.

The costs of implementing the programme of measures set out in this strategy will be considered in the normal way in connection with the annual budget process. This chapter therefore only presents a general evaluation of their economic consequences.

The strategy emphasises the importance of effective measures to prevent the introduction of invasive alien species. Authority relating to the introduction and release of alien species (or intentional introduction) is divided between several ministries. The strategy does not propose any changes to the current arrangements. The intention is to use the systems already established for dealing with intentional introductions and develop them further. If new or revised rules are introduced in this area, it may be necessary to devote a larger proportion of administrative capacity to such cases.

Enclosures of all types where living organisms are to be kept must be adequately secured to prevent escape if the organisms are of species that may be invasive in the wild. For certain types of activities, there are already rules for the technical standards that such facilities must satisfy. In such cases, implementation of this strategy is not expect to entail additional costs. In cases where its implementation results in the introduction of new requirements for sectors that do not currently have to meet specific technical standards for enclosures for living organisms, the economic consequences may be somewhat greater, but probably not very substantial.

Effective measures to prevent unintentional introductions may entail more intensive control of imported goods, including means of transport and packaging, and of persons. This may require improvements in the capacity and expertise of the inspection and enforcement authorities.

Information activities have also been identified as a key element of efforts to prevent unintentional introductions and the further spread of already introduced species. This is bound to involve some costs. However, it should largely be possible to absorb these activities into the various sectors' existing information and communication activities.

If an alien species that may be a threat to biodiversity or to Norwegian society has already been introduced, the strategy emphasises the importance of eradication, control and containment measures. It is not possible to estimate the costs of such

measures in general terms, since they vary depending on which species is involved. However, experience shows that such measures are costly.

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