Executive Summary

Humpback whale and calf.

BIOSYYVES LEFEVRE

At the dawn of the new millennium seven out of the 13 great whale species are still endangered or vulnerable after decades of protection. Years of overhunting drove the Atlantic population of gray whales into extinction, and so severely depleted the eastern North Atlantic right whale population that it is on the verge of disappearing from the planet.

The North Atlantic right whale was down to 100 animals when hunting was banned in 1937, and the endangered Antarctic blue whale was pursued until its numbers plunged to less than one per cent of its former abundance. Other cetaceans, including dolphins and porpoises, have also dropped to critically low levels. Each year over 1,000 whales are still being killed for the commercial market, in spite of the global moratorium on commercial whaling.

Over the past few decades, the great whales and other cetaceans have fallen prey to new and ever-increasing dangers. Collisions with ships and entanglement in fishing gear threaten the North Atlantic right whale with extinction, while the critically endangered western North Pacific grey whale is at serious risk because of intensive oil and gas development in its feeding grounds. Scientists estimate this population numbers between 100 and 200 animals. Alarm is growing over other hazards including toxic contamination, the effects of climate change and habitat degradation, all of which are taking an increasing toll on the world's whales and other marine mammals.

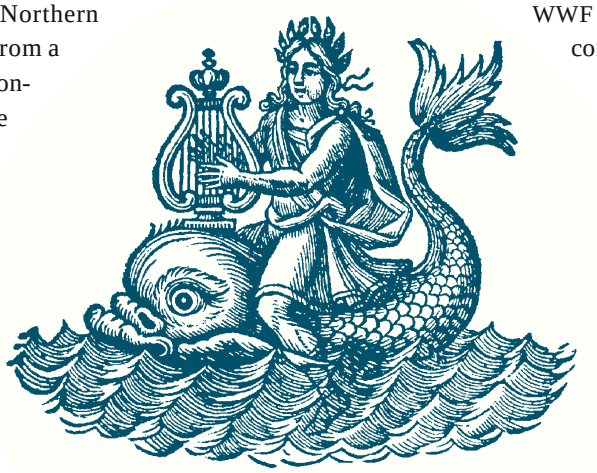
Pilot whales, still hunted and eaten by the people of the Faeroe Isles, have such high levels of PCBs, pesticides and heavy metal that the Faeroese have been warned to restrict the amount they consume and not eat the whale liver or kidney. Latest research reveals that baleen whales are also affected by chemicals accumulating in their blubber, which slowly release into their milk when they migrate to winter calving grounds. Evidence is growing that the effects of industrial chemicals and pesticide run-offs on whales and dolphins are potentially the gravest threats to their survival.

During the past three decades, the fishery bycatch problem of driftnets and gillnets, has caused the death of thousands, if not millions, of cetaceans. The unusually high bycatch of 128 Northern minke whales by South Korea in 1996 from a threatened population, was particularly worrying. However, in some countries today, fishing communities struggle to keep alive the centuries-old tradition of giving whales, dolphins, and other marine mammals, which are accidentally killed in fishing nets or which happen to wash ashore, a human burial. In Japan and Vietnam, temples and shrines built to commemorate the souls of whales drowned in fishing nets are still maintained.

Despite a number of conservation victories for the whales – including the moratorium on commercial whaling and the declaration of virtually the whole of the Southern Ocean as a whale sanctuary in 1994 – whales are still hunted and this remains a potential threat. Since the International Whaling Commission (IWC) moratorium on commercial whaling came into effect in 1985-1986, by April 2001, 21,573 whales had been caught, mainly by the former USSR, Japan and Norway.

Japan has killed over 5,620 minke whales for so-called scientific purposes, mainly in the Southern Ocean Whale Sanctuary. Norway, which lodged an official objection to the moratorium, has caught 287 whales for "scientific purposes", and hunted over 4,000 Northern minkes for commercial purposes from a depleted population. Norway has continued whale hunting, in spite of the repeated requests by the IWC urging them to stop, and the growing popularity of whale watching in Norway.

In order to help secure the future of the world's whales, WWF is developing an ambitious conservation programme for endangered whale species and populations. WWF's long-term vision for whales is for all populations of whales to have recovered to viable numbers and to be thriving throughout the oceans.



Arion playing his harp on a dolphin's back – the seventeenth-century imprint of the bookseller Sam Buckley.

In the medium term, WWF is working for a significant reduction of threats to endangered populations of great whales as well as several smaller cetaceans. The threats that WWF will focus on include:

- reducing ship collisions (especially the Northern right whale)
- decreasing entanglement in fishing gear
- protecting whales and other cetaceans from chemical contaminants
- reducing greenhouse emissions and wasteful consumption that contribute to climate change
- bringing whale hunting under the strict control of the International Whaling Commission (IWC)

One of WWF's greatest success stories was its role in the international campaign to help secure protection from whaling in about one-third of the world's oceans. This was achieved in 1994 when the International Whaling Commission (IWC) declared virtually the whole Southern Ocean around Antarctica as a whale sanctuary. The 50 million km^2 Southern Ocean Whale Sanctuary, whose boundary joins the 1979 Indian Ocean Sanctuary's southern boundary, is crucial for allowing the recovery of the whale populations that suffered the most from the 20th century whaling fleets.These whales were originally the most abundant in the world.

Global concern over ongoing whaling by Japan and Norway continues, and WWF and other NGOs are pressuring these nations to abide by the IWC decisions. WWF believes that the IWC must regain its control over the management of whaling, the abuse of scientific whaling should be ended, there should be a ban on all whaling with factory ships on the high seas, international trade in whale meat should remain banned, the Southern Ocean Whale Sanctuary should be strengthened and more whale sanctuaries created.

WWF is combating threats to large and small whales through field research, training and capacity building, conservation education, and by securing improved national and international action and agreements. Through support to TRAFFIC, the wildlife trade monitoring programme of WWF and IUCN, the organization is closely investigating and monitoring the illegal trade in whale meat.

WWF is also encouraging carefully controlled whale-watching, which in 2000 attracted some nine million enthusiasts in 87 countries, and generated a record-breaking US$1 billion in revenue. The income earned by the industry had doubled in only six years. In Iceland, whale watching passenger numbers have grown from just 100 in 1991 to a staggering 44,000 in 2000. Recent analysis suggests that the economic value to the Icelandic economy of whale watching may now exceed what would be gained if Iceland resumed commercial whaling.

Since WWF's founding in 1961, which coincided with the highest number of whales reported killed – 66,090 – one of its highest priorities has been to celebrate and fight for the survival of the great whales.

The Whales in History and Culture

From the Arctic to the Antipodes, people have celebrated and sung of whales and dolphins for centuries, but the first person to write about them was the Greek philosopher, Aristotle, who lived from 384 to 322 BC. He described whales, dolphins, and porpoises as cetaceans and distinguished them from fish: "The dolphin, the whale and all the rest of the cetacea, all that is to say, that are provided with a blow-hole instead of gills, are viviparous... The dolphin has been asleep with his nose above water and when asleep he snores...". Aristotle also described how fishermen who caught dolphins would "nick their tails and set them adrift again and by this expedient their ages are ascertained". Thus, it could be said that the Greeks carried out the first non-lethal or benign research on marine mammals. Greek poets and artists celebrated the sea, *thalassa*, as the source of life, as it is in many creation myths. Apollo, Greek god of the sun (who turned into a giant dolphin), and Poseidon, god of the sea, protected marine mammals. The oldest images of whales are found carved into rocks in Scandinavia and date from the Stone Age, around 5000 BC. The colourful dolphin frieze at Knossos Palace on the island of Crete is the earliest known picture of a dolphin, painted around 2000 BC.

Whales and dolphins were revered not only by early inhabitants of the Mediterranean, but also by a number of coastal communities on every part of the globe. Upon finding a whale washed ashore, the Kwakiutl Indians of the Pacific Northwest mourned its death. They "prayed" or chanted over the body.

WWF/E. KEMF

In Vietnam, whales, dolphin, and other marine mammals are sometimes given a human burial.

At the opposite end of the world, in what is now New Zealand, one Maori legend describes how the original settlers followed the migratory paths of the whales as they travelled across the great water from the mythical Pacific island of Hawaiiki. Some say they descended from a man who rode in from Hawaiiki on the back of a whale, to the "Land of the Long White Cloud" around 1,500 years ago. At the landing place of the pair, a Maori meeting house has been built in their honour. A large wooden carving of a man riding a whale adorns the house's gabled roof.

In Asia, other types of temples and shrines have been built to commemorate the souls of whales killed in the nets of fishermen, most notably in Japan and in Vietnam. On a small island in the Sea of Japan, an annual requiem is held in spring at a Buddhist temple to honour the souls of dead whales. In the 17th century, whales were caught in nets near the island. During butchering, the fishermen collected whale embryos from female whales, wrapped them in straw mats,

then took them to a temple where the monks gave them a human burial. Every time a whale was hunted and killed, it was given a Buddhist name, and its exact date of capture (and death) recorded in the temple. Not far away, on the coast and on islands in the South China Sea, similar temples and shrines were also built, beginning in the 18th century. In Vietnam, a fisherman who accidentally drowns a marine mammal in a fishing net, or finds one washed ashore, follows a centuries-old tradition and gives it an elaborate human burial. He honours the whale or dolphin as if it were his own father. Three years to the day after a cetacean dies, its bones are dug up, carefully washed by fishermen's wives, and the skeleton reassembled. These are then transported on an elaborate wooden litter "one used for human burials" by a group of pallbearers to the Temple of the Whale. Only two temples of this type remain in Vietnam today, but they are considered to harbour sacred souls, "the mandarins of the sea" who, when they die, ascend to heaven, where they become "Angels of the Sea in the Sky".

Factory ships and exploding grenades

While some cultures and countries were celebrating whales, others were developing methods that would begin to decimate them. In Europe, the Basques began whaling in the 11th century, soon followed by the Dutch and the English. The first target of commercial whaling was the northern right whale, *Eubalaena glacialis*, which is now the most endangered of all the great whales with some stocks near extinction. The profitable and unregulated business of commercial whaling spread to the American colonies, with right, humpback, *Megaptera novaeangliae*, and sperm whales, *Physeter macrocephalus*, being the next targets. In the 19th century, steam-powered catcher boats and the exploding grenade attached to a harpoon revolutionized whaling. Factory ships added to the toll on the whales: more were killed in four decades than in the previous four centuries. This technological leap allowed the whalers to kill fast-moving species such as the blue, *Balaenoptera musculus*, and fin whale, *Balaenoptera physalus*.

By the early 20th century some whale stocks were showing signs of overexploitation. In 1925, the League of Nations recommended that the whaling industry be regulated in order to protect whales from overhunting. As a result, the International Council for the Exploration of the Sea established the Bureau of International Whaling Statistics in 1930. A year later the first international regulatory treaty, the Convention for the Regulation of Whaling, was signed by 22 nations in Geneva. This treaty gave full protection to right whales, immature whales, and females with calves. Unfortunately, Japan, Chile, Argentina, the USSR, and Germany, important whaling nations, were not party to the agreement.

The same year the treaty came into force, over 43,000 whales were hunted. Since blue, fin, and sperm whales were among those killed, meat and oil production from these animals was at its highest peak ever. In a little over 10 years, since 1920, whale oil production had increased 20-fold. In an attempt to limit whale oil production, the whaling nations initiated the Blue Whale Unit system as a means of regulating the market. But as a conservation measure it failed miserably. For example, whales were hunted according to their whale oil potential, while their age, size, population dynamics, and distribution were unknown or ignored. One blue whale was equal to two fin, two and a half humpbacks, or six sei whales. During the 1930s regular meetings were held in an attempt to restrict whaling even further. Finally, in 1937, eight years after the first whaling treaty came into force, total protection was conferred on gray whales, and minimum size limits were set for fin, blue, humpback, and sperm whales. In addition, the 1937 convention acknowledged the differences between factory-ship whaling and coastal whale hunting and established separate seasons for each.

Icelandic whaling, pictured here, stopped in 1989, and whale watching has become a popular industry.

In 1946, the International Convention for the Regulation of Whaling came into effect, and in 1949 it established the International Whaling Commission (IWC), with 14 member

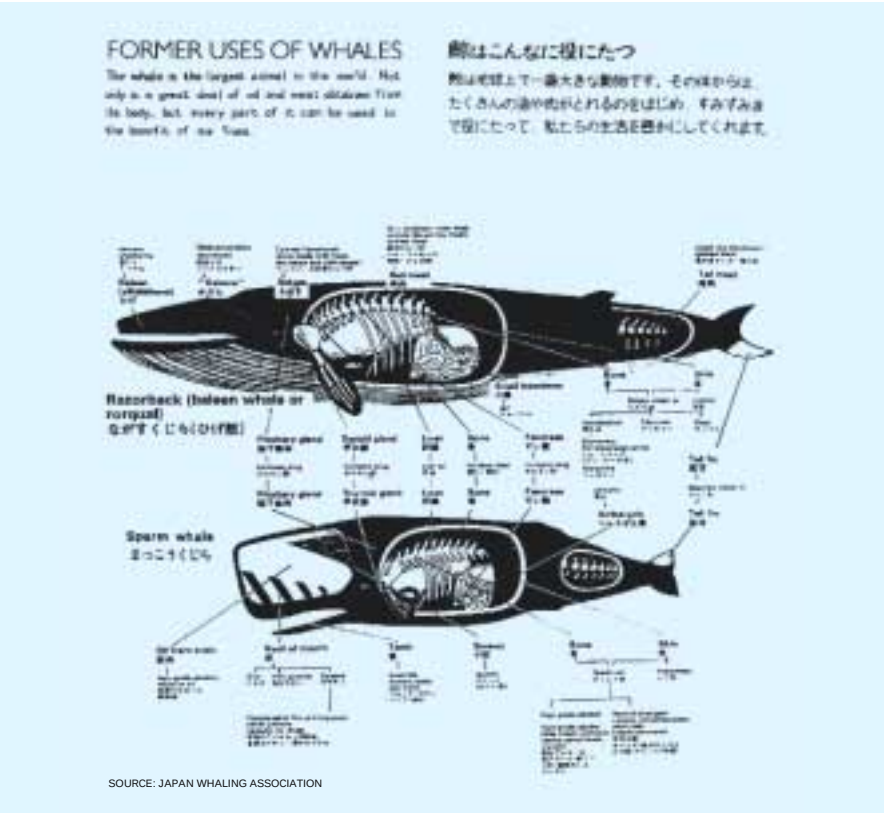
BIOS/MICHEL BREUIL

nations. The IWC revived the Blue Whale Unit catch quota, consistently adopted the highest estimate for whale quotas recommended by the IWC scientists, and re-opened whaling of Antarctic stocks of humpback whales, protected since 1939. Some whaling nations exceeded quotas set by the IWC, failed to report the number of whales actually killed (as WWF and other NGOs have learned and reported on over the years), objected officially to hunting bans on blue whales and killed them anyway. In short, they ridiculed the convention, until the treaty nearly collapsed. In 1961, the whaling nations hunted more whales than ever and killed over 66,000.

Gray whale extinct in the Atlantic

In the following years, catches began to decline because the whalers could not find enough whales to kill. By the time the blue whale was given full protection in 1965, it was virtually gone from the Antarctic. At up to 30m long, the blue whale is the largest animal ever to have lived on earth, and is scattered throughout all oceans. In 1989, scientists estimated that the blue whale, whose numbers could have been as high as 250,000 in Antarctic waters before commercial whaling began there, could be as low as 210 to 1,000. The fin whale, second in size to the blue, was severely reduced in numbers in all oceans, especially in the Southern Ocean.

Probably the most well-known whale, immortalized by Herman Melville in the novel *Moby Dick*, is the sperm whale. It was heavily exploited, mainly for its oil, right up until 1987. Unlike edible baleen whale oil, sperm whale oil was used for lighting fuel and various industrial purposes. Over the centuries, the gray whale, *Eschrichtius robustus*, was the first to suffer extinction of a stock. Of the original three populations, one was probably wiped out by early whalers in the North Atlantic. A second stock was nearly eradicated in the mid 20th century in the western North Pacific. However, the eastern North Pacific population has recovered from very low levels after being heavily exploited in the late 19th and early 20th centuries. When WWF was founded in 1961, it accepted the challenge of working with governments and other NGOs to help reverse the drastic population declines in the world's great whales.



Today whales are killed for their meat, sold as a delicacy in Japan. In former times, whales provided oil for lamps, whalebone for corsets, strings for tennis rackets, glue, leather, all of which are now obtained from other sources.

Natural History

There are over 80 species of cetaceans, a group made up of whales, dolphins and porpoises. Of these, 14 species are commonly referred to as the great whales and include the bowhead, North Atlantic right, North Pacific right, Southern right, pygmy right, blue, fin, sei, humpback, Bryde's, Northern minke, southern minke, gray, and sperm whales. The only great whale with teeth is the sperm whale.

Cetaceans are air-breathing, warm-blooded mammals that bear live young and nurse them on milk, living their entire lives in the sea. The study of fossils indicates that cetaceans evolved from four-legged, terrestrial ancestors that made their way back to the seas around 50 million years ago.

Completely adapted to life in the water, whales breathe through blowholes (whales' "nostrils") on top of the head, which allow them to take in air without interrupting swimming. Of the great whales, the deep-diving sperm whale is the champion at holding its breath. The longest recorded dive by a sperm whale lasted one hour and 13 minutes. Sperm whales can descend to depths of up to two kilometres.

Unlike fish, which swish their tails from side to side, whales swim by pumping their tails vertically, and using their flippers to steer. Cetaceans' bodies are encased in a layer of blubber that provides both buoyancy and insulation. Blubber also stores energy, and great whales that migrate draw from these fat reserves while transiting between their foraging and calving grounds. Cetaceans fall into two categories: mysticetes or **baleen whales**, and odontocetes, including **toothed whales**, oceanic and river dolphins, and porpoises.

NEW ENGLAND AQUARIUM

Baleen whales are named for a series of vertical plates of comb-like baleen which descend from the roof of the mouth.

Baleen whales

The baleen whales are named for their feeding apparatus, a series of transverse plates of comb-like baleen which descend from the roof of the mouth. Baleen is made of hard but flexible material, similar to that of human fingernails, rooted in the animal's upper jaw. The baleen act like a sieve, allowing a whale to strain food out of the water. This food includes small fish and plankton. It may seem odd that some of the world's largest creatures feed on some of the world's smallest creatures. For instance, the adult blue whale can eat 4 tonnes of krill a small shrimp like crustacean, per day.

There are 13 species of baleen whales: blue, fin, sei, Bryde's, humpback, Northern minke, Southern minke, North Atlantic right, North Pacific right, southern right, pygmy right, bowhead, and gray. They range in size from the pygmy right, whose average length is around 6 metres, to the gargantuan blue whale,

which can reach lengths of over 33 metres and weigh up to 120 tonnes – as much as 32 elephants.

Toothed whales

The odontocetes, or toothed whales, are comprised of all non-baleen whales plus all dolphins and porpoises. They differ from the baleen whales in two major ways: they have teeth instead of baleen, and they have one blowhole rather than two.

Toothed whales, dolphins and porpoises, are a diverse group of over 70 species. They range in size from the Hector's dolphin and vaquita, both roughly 1.5 metres long when fully grown, to the mammoth 18 metre male sperm whale. Some other examples are the bottlenose dolphin, harbour porpoise, orca (killer whale), two species of pilot whale, beluga whale, narwhal, finless porpoise, and the rather large family of beaked whales. The Indus, Ganges, Yangtze and Amazon river dolphins live only in fresh water rather than the sea.

Foraging and communication: the role of sound

In their often dark and murky underwater world, whales and dolphins are heavily dependent on their sense of sound to locate prey, although some cetaceans also have good vision. Unlike sight, sound is equally effective day and night. In general, toothed whales hunt more by sound than by sight, using echolocation. They send out a series of high-frequency clicks which bounce back when the sound waves encounter solid objects such as prey. From the returning sound waves the whale can determine the distance, shape, composition, and orientation of an object. Some whales hunt in groups, rounding up and corralling prey or a school of fish that might be too difficult for one individual to take on. For example, pods of orcas – also known as killer whales – attack other cetaceans regularly, and successful predation on the larger species depends on group cohesion and coordination.

Sound is also important for communication. Toothed whales use high-frequency clicks to communicate as well as hunt. Baleen whales do not echolocate, but they use low-frequency sound to communicate, sometimes across great distances, using sounds researchers describe as moans, rumbles, and grunts.

Reproduction and migration

Most baleen whales are migratory, feeding in colder waters that are rich in plankton, and travelling to lower latitudes to bear their young so that the calves can live in warmer water until they develop a sufficient insulating layer of blubber. After a calf is born its first act is to swim to the ocean surface to breathe. Sometimes the mother swims beneath a weak calf to help it to the surface, but generally calves are able to swim and dive immediately after birth. A calf may be tended by another adult while its mother searches for food. Mothers nurse for a relatively long period of time; some odontocetes are not fully weaned until they are two years of age.

Gray whales and humpbacks undertake the longest migrations of all whale species. For example, eastern North Pacific gray whales feed in the Bering Sea between Alaska and Russia and travel all the way to Baja California to have their calves, a distance of 12,000 to 20,000kms. Whale watchers all along the North American west coast have taken delight in observing these world travellers as they swim between their southern breeding grounds to the cold and rich waters of the north.

PRISMA/FLIP NICKLIN

Toothed whales, dolphins and porpoises, range in size from 1.5 metres long when fully grown, to the mammoth 18 metre male sperm whale like the animal pictured here.

WWF's Whale Campaign

The plight of the great whales was so desperate by the early 1960s that it was among the reasons for the foundation of WWF in late 1961. The highest ever number of whales reported caught was 66,090 in the 1961-1962 Antarctic whaling season. These were mostly fin and sperm whales, since the blue whales had by then been hunted close to extinction.

Sir Peter Scott was one the founders of WWF, and in 1963 he set up the IUCN Species Survival Commission's Cetacean Specialist Group to investigate what was happening to the great whales. The very first of the IUCN Red Data Books, drawn up in 1964, included six species of great whales: blue – named as the most endangered of all the large whales – fin, humpback, bowhead, and the northern and southern right whales.

From 1965 to 1987, Sir Peter Scott was WWF's spokesman at the yearly meetings of the International Whaling Commission (IWC). For nearly a quarter of a century he helped expose the scandal of what was happening to the whales and then – step by step – to put a stop to it.

Until 1972 the IWC did not set catch limits by individual species of whales, but by the commercially important species of baleen whales as a group, and even then only for the Antarctic. Quotas were given in "blue whale units". For example, one blue whale, or two fin whales, or 2.5 humpback whales, or six sei whales. As a basis for trying to make whaling sustainable, this system was totally unworkable. Even though the true extent of the catch was not known at the time, public concern and anger at what was happening to the great whales was building up rapidly in many countries around the world, especially among WWF supporters.

WWF INTERNATIONAL

WWF's research vessel, the Tulip, and crew in the Indian Ocean Sanctuary pioneered benign or non-lethal whale research.

As of 1973, the USSR and Japan were hunting around 80 per cent of the world's whales. In 1976, WWF launched The Seas Must Live Campaign. The fate of the world's whales and other cetaceans was the centrepiece of WWF's special three-year marine programme. The campaign aimed at safeguarding marine mammals and their critical habitats and to stimulate governments and intergovernmental agencies to act on a wider scale. This campaign aimed at raising funds for the establishment of an international system of whale sanctuaries. It inspired creation of marine reserves around the world including the Indian Ocean Whale Sanctuary, Ecuador's whale and marine mammal sanctuary in the Galápagos Islands, and Brazil's Abrolhos Marine National Park.

A sea change in the IWC

By 1978, the atmosphere of the IWC had undergone a sea change. It had acquired new members, many of them conservation-minded. People around the globe were listening to "whale songs", first recorded by scientists Dr Roger Payne

and Katy Payne. Scientists and environmentalists joined forces. In 1979, a moratorium on all deep sea whaling using factory ships for whales other than minkes was carried by a vote of 18 to two, with Japan and the USSR the only nations to vote against it.

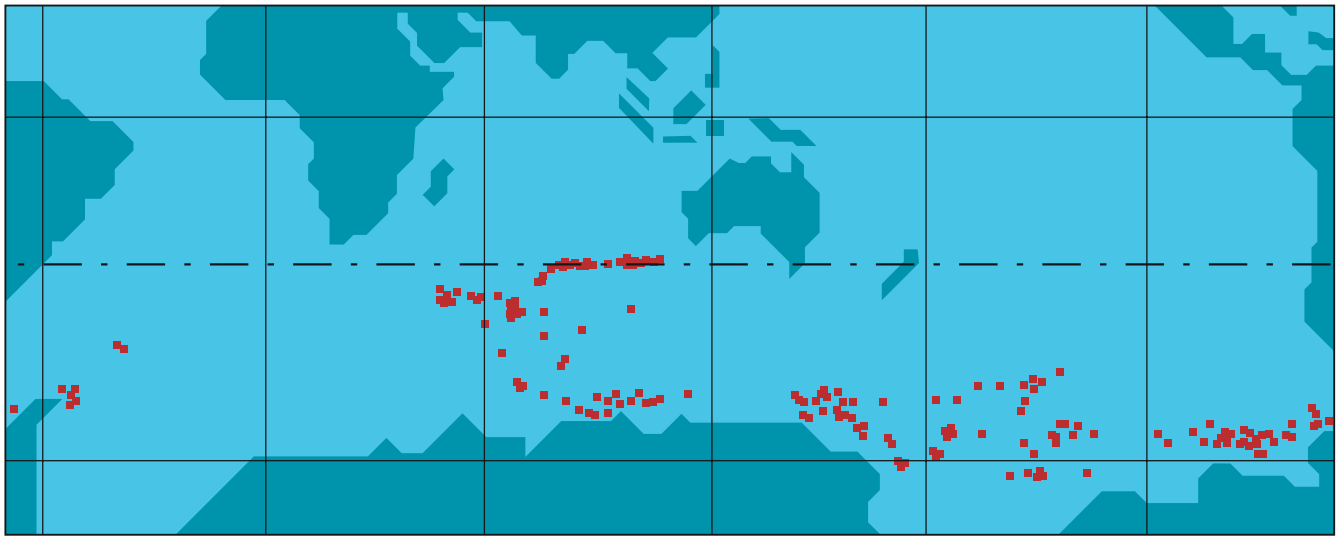
Also in 1979, a news item in the London Sunday Times reported that a prominent British scientist had received a letter from a Soviet scientific worker aboard a factory ship alleging that the USSR was breaking the laws of the whaling industry. His fleet alone had taken 1,916 whales more than its quota.

In 1993, the world learned that this letter was not a hoax: Soviet fleets had been catching massive numbers of the world's most endangered whales right through the 1960s and 1970s and selling the meat to Japan. In 1993, a letter sent to WWF from a leading Russian scientist, Dr AV Yablokov, revealed the "enormous scale of the Soviet falsifications of the official data for IWC". Between 1949 and 1980, the USSR caught over 3,200 right whales (protected since 1935) and over 48,450 humpback whales (protected by the IWC in 1963). The new data also shows that 1,433 highly endangered blue whales, (protected by the IWC in 1965) were also slaughtered. The Soviet fleet reported that they had caught only 156.

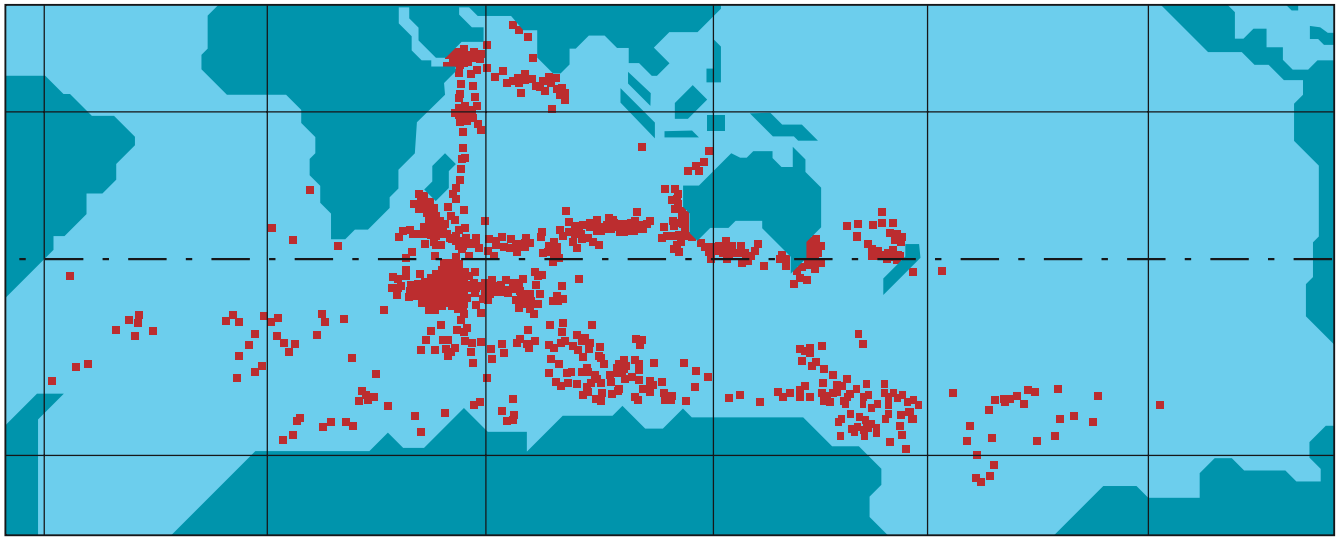
Further deceptions involved large catches of Bryde's whales and sei whales in the Indian Ocean in 1972, and of sperm whales north of Hawaii up to 1975 when that population was wiped out. All this happened despite the presence of national observers on the ships, and continued even after an international observer scheme was in force, with Japanese observers.

The Indian Ocean Sanctuary

However, some hope for the whales was on the horizon. In 1979, the IWC declared the entire Indian Ocean – from the coast of Africa west to Australia, and from the Red and Arabian Seas and the Gulf of Oman south to 55 °S latitude – as a



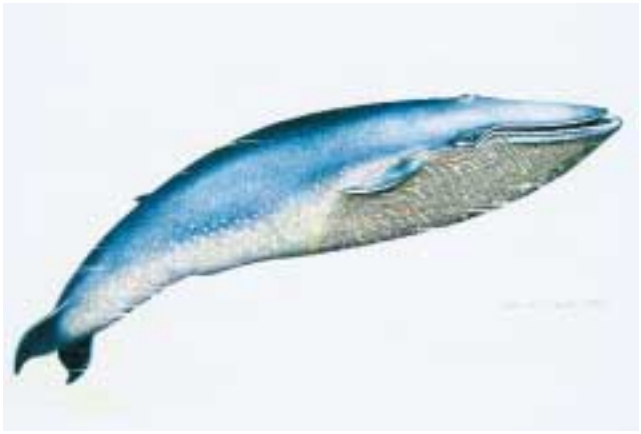
Blue whale reported catch by the Soviet Antarctic Fleets, 1961-1972.



MAP BY YABLOKOV/WWF KATHMANDU 2000

Blue whale real catch by the Soviet Antarctic Fleets, 1961-1972.

whale sanctuary. In 1989 the Indian Ocean Sanctuary was extended for a further three years, and then in 1992 the IWC agreed by consensus that it should remain a sanctuary for an indefinite period. As soon as the sanctuary was declared, WWF-Netherlands began to raise funds to help finance research. In 1980, HRH Prince Bernhard, President of WWF-Netherlands launched an appeal which raised 400,000 Guilders (US$250,000) dedicated to the study of living whales in the new sanctuary. Meanwhile, WWF was already using the money raised by WWF- Netherlands to fund studies of live sperm whales and other cetaceans in the Indian Ocean Sanctuary. The research vessel for this was the Tulip, WWF's ocean-going yacht, which carried out innovative research into sperm whales and other cetaceans in the Indian Ocean between 1981 and 1984. Soon after the Tulip set sail in the Indian Ocean, images



WWF/CANON PHOTOLIBRARY

Drawing of a blue whale by Helmut Diller.

of blue and sperm whales and the Tulip crew were beamed around the globe. They drew dramatic attention to the plight of the world's whales, and the fact that they could be studied without killing them.

At the IWC annual meeting in July 1982, the government of the Seychelles, an island nation in the Indian Ocean, tabled a resolution for a moratorium on commercial whaling, beginning in 1985-1986. At this historic meeting, an indefinite moratorium on commercial whaling was passed by a majority of 25 to 7, with 5 abstentions. Within 90 days, Japan, Norway, USSR, and Peru lodged official objections to the moratorium, thus ensuring their right to continue whaling after 1986. In 1984, Japan announced that it intended to continue to hunt sperm whales in its coastal waters until 1988 – two years after the commercial whaling moratorium was to come into place.

Whaling during the moratorium

Some of the whaling countries, which opposed the 1982 moratorium, were convinced of the need to halt commercial whaling before the 1986 deadline. But others including Japan and Iceland slipped through a loophole in the convention and continued to kill whales for so-called scientific purposes. In the US, NGOs including Greenpeace boycotted Icelandic fish products and Japan Airlines and called on the US government to impose sanctions on IWC members who did not comply with IWC recommendations. Environmentalists took the US government to court because of an unorthodox agreement between the US Secretary of Commerce and Japan which would allow Japan to take 1,200 sperm whales up to 1988, if Japan agreed to stop commercial whaling by that time.

Japan withdrew its objection to the whaling ban, but it has side-stepped the moratorium on commercial whaling until this day. Its whaling boats hunted sperm whales until 1987 and its factory ships have carried out "scientific" whaling for up to 440 minke whales every year in the Southern Ocean. Under Article VIII of the 1946 Whaling Convention, members of the IWC are given the right to grant their nationals special permits allowing whales to be killed for "purposes of scientific research".

By April 2001 Japan had caught 5,621 whales under the guise of science since the moratorium came into effect in 1985-1986, mostly in the Southern Ocean but also in the North Pacific. These were all minke whales, until 2000 when Japan extended its scientific whaling to include some sperm whales and Bryde's whales as well as minkes, ignoring the widespread international condemnation. Norway, Iceland and South Korea also conducted more limited scientific whaling programmes for various periods between 1986 and 1992. The IWC Scientific Committee has stated that none of this lethal research is necessary for management purposes. Iceland left the IWC in 1992 and has not been whaling since.

Russia (former USSR) and Norway have maintained their official objections to the moratorium which means that they are not legally bound by it. The USSR stopped all commercial whaling after the 1986-87 Antarctic season, but Norway has caught whales every year except 1991. Since the moratorium came into force, Norway has caught 146 whales for science purposes from 1988 to 1992, and a total of over 4,000 for commercial purposes in 1986, 1987, and between 1993 and 2000. Norway is now planning to grant export permits for whale meat and blubber, even though it failed to achieve a relaxation of the CITES ban on trade in whale products at the last three CITES conferences. Norway has a reservation in CITES to the ban on trade in whale meat. The planned export has led to strong pressure from the Norwegian whalers to increase their annual quotas, since they will be able to sell the meat for a much higher price by exporting it to Japan.

Meanwhile, Japan has been pursuing a policy that it calls "vote consolidation" in the IWC, encouraging several small island states and other developing countries to join the IWC and vote with the whalers. This has led to a situation of complete deadlock between the whalers and non-whalers, with whaling now steadily increasing again even though the moratorium is still in place.

The Threats Facing Whales

Over the past few decades, the great whales and other cetaceans have fallen prey to ever-increasing dangers. Collisions with ships threaten one species with extinction, while entanglement in fishing gear, toxic contamination, disease and habitat degradation are also taking an increasing toll on all marine mammals, fish and marine turtles.

Historically, the large-scale whaling industries of many countries (especially USA, Japan, USSR, UK, Netherlands, Germany and Norway) devastated one species of whale after another throughout most of the 19th and 20th centuries, often leaving only remnant populations. Many of these whales are still endangered. Even though most populations of whales have been fully protected from hunting for some time, a number of these were reduced to such very low levels that it is taking them decades to recover. Some are still so depleted that we are not sure if they will ever make a comeback. The western North Pacific population of gray whales is Critically Endangered, and five great whale species are classified as Endangered. (See Current Status of the Great Whales on page 18.)

Even if whaling were subject to a strict and precautionary management regime that could ensure it was sustainable, many cetacean species would still be vulnerable and even risk extinction by other growing threats. There can be very few populations left of any cetacean anywhere in the world that are not affected by these growing threats, and many are facing a range of hazards, outlined below.

A view of the "whale fishery" from around 1770.
Published by Alexander Hogg at the Kings Arms, London.

GREENPEACE/OBIOL

Dead sperm whale thought to have been killed by illegal Italian driftnets in the waters near Mallorca, Mediterranean.

Entanglement and bycatches in fisheries

Entanglement in fishing gear kills more cetaceans worldwide each year than any other mortality factor. The last four decades have witnessed the rapid expansion of many fisheries, as well as the advent of synthetic driftnets and gillnets. Consequently, there has been an alarming increase in the number of whales, dolphins and porpoises being caught accidentally in fishing nets and lines. This problem is often referred to as cetacean bycatch. How does it happen? Small cetaceans swim into nets, get trapped underwater, and die when they cannot surface to breathe. Entangled large whales can also drown but less often, as they are generally powerful enough to break free. Nevertheless, after breaking loose of the nets, they may continue to tow some of the gear for long periods, and this can cause debilitating injuries and even slow death. Fishing line, for example, can coil around an animal's head or lodge in its baleen, interfering with feeding. The gear can also get wrapped around the body and flippers, tightening and chafing as the whale swims. Bycatch seems to be an especially big problem in the Republic of Korea, where hundreds of Northern minke whales have been caught in fishing nets.

Although data on the incidence of gear entanglement is scant, it is known that all major gear types used in fisheries, ranging from subsistence level to large commercial scale, in oceans as well as rivers, catch and kill cetaceans. The best available data suggests that 65,000 to 85,000 cetaceans die each year in gillnets and similar gear. Because most incidental catch goes unreported, the true figure is likely much higher, and many other gear types are not included in this figure.

In 1990 alone, between 315,600 and 1,060,200 cetaceans were killed in high seas driftnets (mostly of Japanese and Taiwanese origin) in the Pacific and Indian Oceans and the Mediterranean. In 1993, in an effort to combat this problem, the UN established a global moratorium on large-scale drift

and gillnets outside 200-mile Exclusive Economic Zones (EEZs), but implementation of this ban still needs to be monitored closely.

In 1986, an estimated 130,000 spinner and spotted dolphins drowned in the purse seine tuna fisheries in the Eastern Tropical Pacific. Since then, however, 97 per cent of those mortalities have been eliminated due to modifications in fishing methods and gear. No such mitigation programme has yet been developed in the gillnet fisheries of Mexico's Upper Gulf of California, where the vaquita – a critically endangered endemic porpoise – faces imminent extinction unless action is taken.

Elsewhere, approaches such as those adopted in the Eastern Tropical Pacific have shown promise. Altering methods and gear is one tactic. Another involves attaching acoustic alarms, or "pingers," to fishing nets. This may alert cetaceans to the presence of fishing gear or perhaps annoy them into swimming away. Pingers have significantly reduced harbour porpoise mortality in gillnet fisheries in the Gulf of Maine and may work for other species as well. Time-area closures are another potentially useful measure. Where a cetacean population's seasonal movements are known, it may sometimes be possible to close a fishery temporarily when the animals arrive and re-open the fishery when they leave. For example, in Cape Cod Bay the gillnet fishery closes when North Atlantic right whales migrate into the Bay and reopens when they have left, which is determined by aerial and vessel surveys. Cape Cod lobstermen fish with modified gear until the whales leave. When prevention fails, disentanglement is sometimes possible. In the US, specially trained rescue teams have successfully removed gear from many large whales, especially right whales and humpbacks. However, this dangerous and expensive emergency response is not considered a practical long-term conservation solution.

Accidents and disturbance

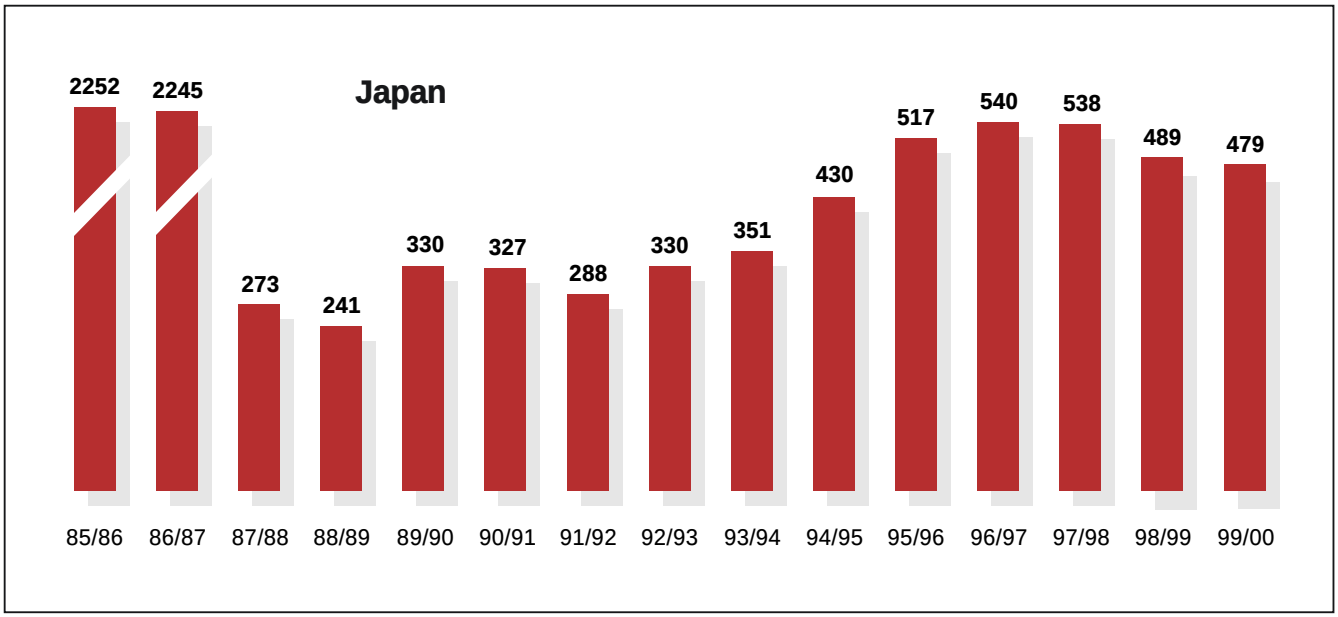
Ship strikes or accidental collisions have been blamed for nearly 90 per cent of all North Atlantic right whale deaths for which the cause is known (excluding natural factors such as old age). Reducing these deaths is a matter of utmost urgency, but one for which there is no simple solution. For some mysterious reason, right whales almost always fail to get out of the way of ships. It is possible that acoustic conditions prevent whales from hearing approaching ships, or that whales hear the ships, but have not learned to recognize them as a threat. Large ships have a great deal of momentum and cannot make nimble manoeuvres. Whales are relatively hard to spot from a distance, so it is not always possible for ships to take evasive action. Occasionally, right whales do swim out of the path of an oncoming ship at the last moment. This has given rise to the idea of speed restrictions in critical feeding and calving areas in order to give whales more time to avoid oncoming ships. However, some experts are concerned that speed restrictions might increase the incidence of ship strikes because this would increase the vessel's transit time through a critical habitat area.

The problem of ship strikes is not limited to right whales. With our oceans and rivers becoming ever more clogged with traffic ranging from pleasure boats to oil tankers and high speed ferries to naval operations, collisions with all cetaceans

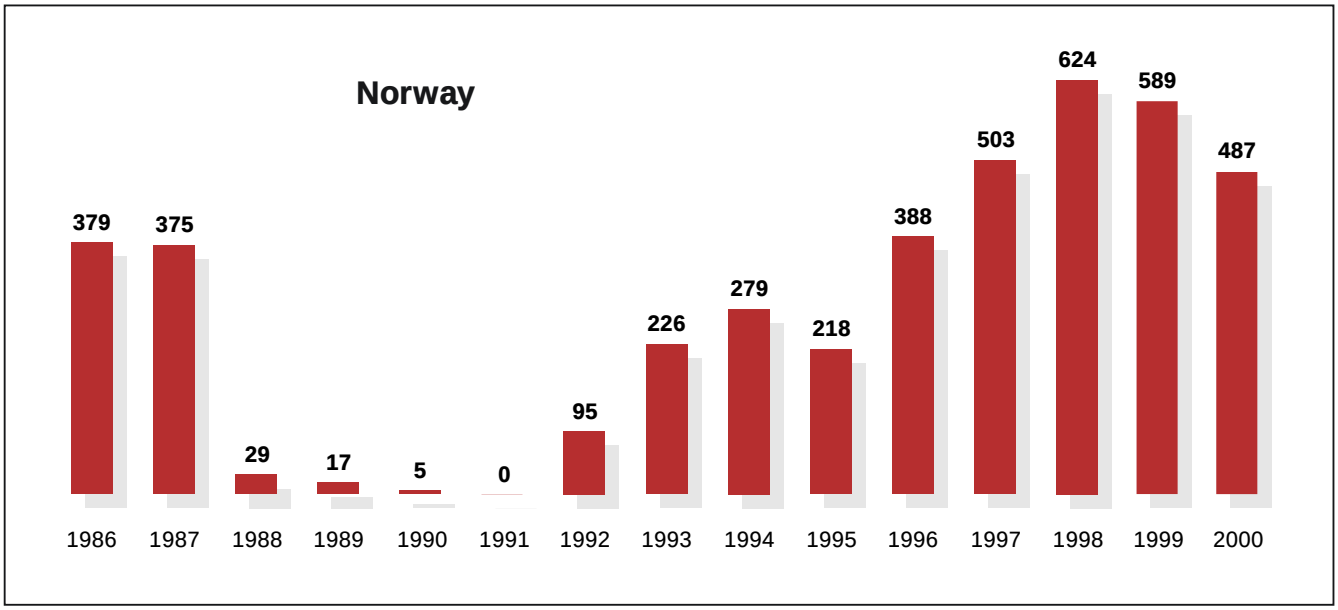
THE NEW ENGLAND AQUARIUM

North Atlantic right whale calf killed in a ship collision is undergoing a necropsy to determine internal organ damage. The fatal gash in the side of the calf was caused when it was struck.

Minke whale catches since the moratorium



Japan had an objection to the Moratorium for the two first years of it being in place and caught well over 2,000 minke whales per season. Japan then started hunting with scientific permits. From 2000, Japan also caught sperm and Bryde's whales.



During the 1986 and 1987 whaling seasons, Norway hunted under objection to the Moratorium, setting its own quotas. From 1988 to 1990, catches were then made with scientific permits. In 1992 commercial whaling was resumed under objection.

are on the rise. Many, if not most, ship strikes are not reported, or even noticed. From time to time a cruise ship or other large vessel steams into port with a carcass impaled on its bow, and it is only then that its crew realizes it has struck a whale. Cetaceans found in coastal areas are especially vulnerable, but it is clear that for the North Atlantic right whale, avoiding ship collisions has become a matter of survival or extinction.

On the North Atlantic right whale calving grounds off Florida and Georgia in the US, Federal and state government agencies and other groups have teamed up to develop an Early Warning System to minimize ship collisions. Weather permitting, daily aerial surveys are flown throughout the December-February calving season, and sighting locations are relayed to the Coast Guard, ship routing authorities, and even individual vessels that appear to be on a collision course with whales. US law prohibits vessels from knowingly coming within 500 yards (approximately 500 metres) of a right whale. A Mandatory Ship Reporting System requires ships transiting through designated critical habitat areas to report their position, speed, and course to the Coast Guard. The Coast Guard responds,

giving any current right whale sighting information and recommendations on how to avoid collisions. A similar reporting system exists in Canada and could soon be a useful channel for advising mariners on averting ship strikes.

Although these ship strike mitigation measures exist primarily for the sake of right whale conservation, other whales also benefit. These precautions offer valuable lessons that can be used to help protect whales and other marine mammals.

Whaling

At the start of the new millennium, whale hunting is continuing at a relatively low level. If it cannot be ended or brought under very tight international regulation, it still poses – together with other mounting threats – a potentially serious conservation danger for the remaining whales.

Scientists have now recognized that there is not just one, but two (and possibly three) separate species of minke whales, so that each species could more easily be depleted by whaling. The Northeastern Atlantic population of Northern minkes was declared by the International Whaling Commission (IWC) in 1985 to be so depleted that no whaling should be allowed on it. It is unclear whether Norway's commercial hunt of Northern minkes (with a quota of 549 in 2001) from this population is now hindering its recovery. In addition, there is still uncertainty in the IWC Scientific Committee about the level of Southern minke populations in the Southern Ocean, and it is possible that the Japanese scientific whaling there (up to 440 a year) is depleting the stocks in some areas.

In a few cases, recovery may be slowed by the continuing annual catches allowed by the IWC for **aboriginal subsistence need**. In 2000, these catches included around 67 bowheads off Alaska and Russia, 140 gray whales off Russia and USA, 187 Northern minkes from the depleted populations off Greenland, 19 fins off Greenland, and 2 humpbacks off St.Vincent.

Chemical pollution

For the past two decades the weight of evidence has been rapidly growing that toxic chemicals – in particular, the Persistent Organic Pollutants (POPs) and Endocrine Disrupting Chemicals (EDCs) – pose a serious threat to marine mammals and humans. There is growing evidence that even extremely low levels of persistent organic chemicals such as PCBs and DDT are increasing susceptibility to disease and decreasing fertility by interfering with the hormonal systems of many animals, including whales and dolphins.

Research indicates that some cetaceans have detectable and sometimes extraordinarily high levels of contaminants such as PCBs, DDT, chlorinated pesticides, brominated flame retardants and tributyl tins (TBT). Biologists have reported a range of effects of these chemicals on cetaceans including immunosuppression, cancer, skin lesions, secondary infections and diseases, sporadic die-offs, and reduced reproductive success. For example, there have been a series of mass die-offs of marine mammals since the 1980s, including bottlenose dolphins along the Atlantic coast of the US in 1987 and 1988, striped dolphins in the Mediterranean in the early 1990s, harbour porpoises in the Black Sea, humpback whales in the western North Atlantic, and dolphins on the Texas coast in 1994. Scientists have linked immune system function and greater susceptibility to viruses to high levels of PCBs found in the dead animals. The endangered beluga whales of the St. Lawrence estuary are now amongst the most contaminated

Harpoon on Japanese catcher ship in the Southern Ocean.

GREENPEACE/CUNNINGHAM

animals on earth, with tumours, reproductive problems and heavy metal poisoning. The pilot whales still hunted and eaten by the people of the Faeroe Isles have such high levels of PCBs, pesticides and heavy metals that the Faeroese have been warned to restrict the amount of whale meat they eat and not to eat the whale liver or kidney.

Scientists have found that the current status of contamination of the marine environment by organochlorines has reached crisis level, with the higher predators being most at risk. Cetaceans are among the most vulnerable of all organisms to the long-term effects of these chemicals. For example, cetaceans have large fatty reserves in proportion to their body size that are ideal repositories for high concentrations of chemicals (such as DDT and PCBs). Their foetuses and nursing calves are exposed to pollutants during critical periods of growth when endocrine, immune and nervous systems are developing. There can be substantial transfer of contaminants via the fat rich milk from nursing mothers.

Until recently it was thought that the baleen whales were not so much at risk from pollutants as the toothed cetaceans such as belugas, sperm whales, and pilot whales, since baleen whales feed on krill, plankton and small fish at the top of a much shorter food chain. However, the most recent research suggests that baleen whales including grays and humpbacks are also affected. If these alarming trends continue, it is possible that some apparently stable populations could suddenly crash with very little warning.

Habitat degradation

Habitat degradation is a key threat to river and coastal wildlife just as it is to terrestrial species. Dam construction, irrigation projects, coastal and riverbank development, and vessel traffic pose particular problems for river dolphins and species occupying estuaries and shallow coastal areas. Dams and irrigation systems block natural movement and social interaction. Agricultural run-off, industrial effluents, and sewage disposal damage fragile river, estuary and near-shore habitats. In tropical areas, mangrove swamps are essential fish nurseries that produce the prey base for cetaceans and other species; when they are cleared for development or destroyed by chemical changes in the water regime, the food supply dwindles.

Noise pollution

Many whales and dolphins depend on sound for navigation and communication, and all the toothed species use echolocation ("seeing" by sending out sounds and receiving echoes from the objects around) to find their food. If the underwater noise levels from vessel traffic and industrial activity are too intense, they may seriously affect the ability of cetaceans to communicate or echolocate. Both oil drilling ships and seismic surveys are strongly suspected of having particularly severe effects on cetaceans. In 1992, humpback whales off Newfoundland, Canada, were found with damaged ear structures after underwater blasting was used in constructing oil installations.

The US and NATO's use of Low Frequency Active Sonar (LFAS) to detect quiet diesel and nuclear powered submarines has stirred up a wave of controversy in recent years. Tests of this sonar system coincided very closely with a mass stranding of Cuvier's beaked whales in 1996 in Greece's Kyparissiakos, and another stranding of beaked whales as well as other species in the Bahamas in 2000. It has not been possible to design a study that shows conclusively whether or not the strandings were caused by the LFAS tests. But the timing of the events and the fact that beaked whale strandings are rare in these places has put the issue under the spotlight and raised important questions. The problem remains under scrutiny.

Global climate change

As the evidence accumulates that global climate change is causing severe perturbations in ocean currents, whales, like other marine species, are likely to be affected. Global warming is already causing polar ice to melt. This could destabilize the ecology of the Arctic and Antarctic feeding grounds of many large whales and acutely jeopardize the bowhead, narwhal, and beluga, which live in Arctic waters year-round. Changes in ocean temperature could also shift the distribution of plankton and fish species, disrupting the feeding patterns of cetaceans that consume them. For example, recent research shows increases in surface water temperature off the Californian coast was linked to a significant decline in zooplankton, which is likely to affect all the species dependent on it, from fish to whales. The IWC held a scientific workshop on climate change and cetaceans in 1996, and set up a permanent working group on the effect of environmental change on cetaceans.

Depletion of whales' food supply: Antarctic krill

There are worrying indications that climate change is also resulting in a drop in the population level of krill. A reduction in supplies of this small, shrimplike crustacean, a key source of food for many marine species, could now be the greatest threat facing Southern Hemisphere baleen whales. A dramatic decrease in krill could be catastrophic, especially for the endangered blue whale. There is evidence that krill is already in short supply at least in parts of the Southern Ocean, with seals, penguins and albatrosses being unable to rear as many young in the 1990s as they did before.

The supply of Antarctic krill is crucial to the whole Southern Hemisphere marine food chain, including all the whales that migrate to the Antarctic to feed. It appears that the main food supply for krill consists of algae which overwinter in the sea ice and are released and begin reproducing when the ice melts, so there is very high productivity close to the ice in summer.

In a remarkable piece of detection work, scientists have examined whaling records of exactly where whales were