

Australia's marine environment in danger

by Suzanne Medway

Background

The marine environment of Australia contains an outstanding diversity of ecosystems, habitats and species. This is partly due to the mixing of subtropical waters, warm-temperate waters and cool-temperate waters along our coastline. Over time, the prevailing environmental conditions have created unique coastal and offshore seascapes, resulting in a rich, natural and cultural resource that is enjoyed by millions of people.

Human activities, however, have the potential to degrade marine environments and threaten the survival of all marine species. In comparison with the rest of Australia, the New South Wales coast is highly developed with many threats and pressures on our marine environment. Large parts of the coastline and most estuaries have already suffered through ad hoc planning and development. Only a very small number of lagoons, catchments and estuaries remain relatively pristine and loss of marine habitat is still occurring.

The importance of invertebrates

Invertebrates are an integral part of marine ecosystems, and play a number of roles that help to support the function and stability of the food chains and ecosystems upon which we, and other animals, rely. For instance, they play an important role in the cycling of nutrients, are essential for the breakdown of plant matter and other detritus, form the basis of many food chains (including those supporting commercial fisheries), provide habitat for other species (eg coral reefs), regulate populations of other organisms (plant and animal) through predation, parasitism and herbivory, and help maintain water quality by filtering large amounts of water during feeding.



Hermit crab (diogenidae sp.) Northern Territory

The natural fauna of invertebrates is diminishing continually and many species have either disappeared or are in the process of disappearance because of man's action, without man even having been aware of their existence or having studied their characteristics and possible uses.

Protecting the marine environment

Nationally, the marine environment is protected under the Environment Protection and Biodiversity Conservation Act 1999 through Environment Australia.

There are five declared marine parks and three marine reserves (as well as nature reserves) covered under this Act.

- Ashmore Reef National Nature Reserve
- Cartier Island Marine Reserve
- Coringa-Herald National Nature Reserve
- Elizabeth and Middleton Reefs Marine National Nature Reserve
- Great Australian Bight Marine Park
- Great Barrier Reef Marine Park
- Heard Island and McDonald Islands Marine Reserve
- Lihou Reef National Nature Reserve (Coral Sea Island Territory)
- Lord Howe Island Marine Park
- Macquarie Island Marine Park
- Mermaid Reef Marine National Nature Reserve
- Ningaloo Marine Park (Commonwealth Waters)
- Solitary Islands Marine Reserve
- Tasmanian Seamounts Marine Reserve

Marine protected areas can be declared under Commonwealth, State or Northern Territory legislation in seas within each government's jurisdiction.

The State and Northern Territory governments have primary responsibility for marine environments up to three nautical miles from the territorial sea baseline. Along most of our coastline, the territorial sea baseline is the low water mark, but in some areas is up to 60 nautical miles offshore.

In general, the Commonwealth Government manages our oceans from the three nautical mile mark to the limit of our Exclusive Economic Zone (EEZ).

Through cooperative arrangements, marine protected areas can be proclaimed in adjacent State or Territory and Commonwealth waters.

Activities allowed in marine protected areas

What you can and cannot do in a marine protected area depends on the purpose for which the area was set aside and how it is managed.

In some cases, virtually all human activity is excluded. Some marine sanctuaries do not allow fishing or the removal of sea life. Other areas have seasonal restrictions on activities, for example, changes to shipping routes to reduce any impact on migrating whales.

In multiple use marine protected areas recreational and commercial activities such as fishing and tourism may occur and are managed sensitively to prevent adverse disturbance to the natural attributes of the marine protected area.

National cooperation

Liaison and close cooperation between the agencies responsible for marine protected areas are critical to achieving protection of Australia's marine habitat. An integrated system of marine parks, national parks and nature reserves is needed to achieve the optimum conservation of biodiversity and habitat protection. Research has shown that marine protected areas can have positive effects on the ecosystems, habitats and species under protection and may also have other benefits including improved fish stocks as a result of the protection of habitats critical for commercially and recreationally important species; dispersal of larval recruits and genetic diversity to surrounding areas; sites for education; increasing community awareness and understanding of marine conservation issues and provision of scientific reference sites for research and long-term monitoring.

Not all of these benefits will necessarily be experienced at every marine protected area. The primary goal of a marine protected area is to protect a full range of marine biodiversity at ecosystem levels (eg estuaries, coastal lakes, islands, rocky reefs), habitat levels (eg sponge gardens, mudflats and coral communities), and species levels (eg seabirds, fish, corals and turtles).

Managing marine protected areas

Effective management of marine protected areas requires that those who use them are aware of and understand the values of the areas, comply with the protection measures, and help ensure visitor enjoyment and safety. Management can be grouped into two broad categories - protection of conservation values and ecological processes and sustainable use and public appreciation, understanding and enjoyment.

There is a range of tools used to plan and manage activities in marine protected areas. These include zoning and operational plans, permits and licences to regulate permitted activities, temporary closures and other relevant legislation that operate in conjunction with marine protected areas legislation.

Zoning

A Zoning Plan or Regulation is used within marine parks as a guide to management and use of an area, and Operational Plans detail the way the Marine Parks Authority manages each marine park and implements the zoning plan. There are four zones used to manage, protect and conserve marine parks.

Marine Sanctuary Zones allow for total protection of marine animals and plants and their habitat. Activities that involve harming any animal, plant or habitat are prohibited.

Habitat Protection Zones give protection to habitat, but allow limited taking of specified fish and plants. Only activities that do not have a significant impact on fish populations and have a negligible impact on other animals, plants and habitat are permitted. Line fishing, spearfishing and hand gathering are all permitted within a habitat protection zone.

General Use Zones allow multiple use, as long as these are ecologically sustainable. Activities in general use zones are subject to generic regulations that apply across the whole park, including permits.

Special Purpose Zones are used when special management systems are required, including protection of Aboriginal and other cultural features, marine facilities, or for specific park management reasons.



Sooty tern, Sterna fuscata

Parks and sanctuaries

There is a difference between marine parks and marine sanctuaries. Most people think that because an area is classified as a marine park, then it must be highly protected and safe from over-exploitation. This is completely false. The vast majority of areas with marine parks are currently zoned 'general use' which means in many circumstances there is very little difference in the activities permitted inside the marine park and those permitted outside.

Marine sanctuaries are coastal, estuarine or oceanic areas managed to conserve biodiversity. They range from small, highly protected areas that focus on species or community protection, to large multiple use areas that include complex linkages of ecosystems and habitats. Marine sanctuaries may include reefs, sea grass beds, rocky platforms, mangroves, estuarine waters, mudflats, salt marshes, shipwrecks, archaeological sites, and coastal and offshore areas of airspace, seabed and water.



Seagrass

Our Society considers marine sanctuaries to be an important tool for achieving conservation objectives in the marine environment. Marine sanctuaries should become one of the primary tools used, within a broader integrated coastal and marine management framework, for the conservation of biodiversity. Other tools used include fishery management strategies, fishing closure notifications, estuary and catchment management plans, conservation agreements, threatened species recovery plans, threat abatement plans and habitat protection plans.

We believe an integrated system of marine sanctuaries will manage processes that may affect biodiversity within marine or estuarine environments.

Marine sanctuaries in marine parks in Australia comprise as little as 3% to 6%. The only way that long term conservation of marine life and habitat can be protected is by having fully protected reserves. Our Society advocates that all states have a comprehensive marine parks sanctuaries system to protect all marine creatures, based on

their biophysical regions and designed to protect all significant habitat types. The vast majority of marine parks are zoned 'general use' which means in many circumstances there is very little difference in the activities permitted inside the marine park and those permitted outside.

We believe that all marine sanctuaries within Australian marine parks should give at least 50% total protection for all marine creatures in that sanctuary. There can be no room for 'any take' of any kind in a marine sanctuary if we are going to protect our marine creatures and their habitat.


Marine sanctuaries have many conservation benefits, such as protecting species that have been overfished and protecting vulnerable habitats such as corals. They may also benefit fisheries through the 'spillover' of fish, eggs and larvae to fished areas and hence provide some insurance against fishery collapse. Success of marine sanctuaries depends on the response of fishermen. For marine sanctuaries to work as a fishery management tool they have to reduce overall fishing mortality. Better supervision is essential. More fishing inspectors or wardens must be appointed if we are going to protect and preserve our marine environment from exploitation.

There is little doubt that marine sanctuaries will have an important role in marine environmental management. They are, for example, one of the most effective ways of protecting vulnerable habitats from the effects of fishing disturbance.

Studies from around the world show that when you declare 30-50% of a marine area as a marine sanctuary not only do the benefits to biodiversity abound, but fisheries and tourism also reap the rewards as there is a large increase in the numbers of big, more productive fish (that spill-over into fishing grounds) and healthier ecosystems to support them. Fishermen along the coastline protest about 'closures' to their fisheries. This is a very common phenomenon and in areas overseas where large marine sanctuaries have been established, a similar response occurred. However, after a few years (usually less than five) many commercial and recreational fishers have become strong advocates of marine sanctuaries when they see the benefits that occur as a result.

Plans of management

The planning process for managing marine protected areas should be flexible to suit local needs and conditions. Management plans usually detail the management of the area over a given period, generally five years, and provide a framework for the development of work programs that meet the objectives of the area. They include procedures



that link management, research and compliance. Management plans are also important in developing community understanding about management intent.

Permits and licences

Permits and licences can be used to manage human use of the park and activities that have the potential to impact on marine life. The regulation of allowable activities within marine protected areas may require permits or licences.

There should be opportunities for community participation, and input into management and education on the benefits of marine protected areas to generate a sense of stewardship in the local community that will contribute to the success of the marine protected area.

To ensure effective management of marine protected areas, people who use them must be aware of and understand the values of the areas and comply with the management controls that protect those values. Therefore, there is a need for an education strategy that highlights the impact of human activity on the marine environment, the role of marine protected areas and the reason for management plans and special management arrangements.

Ongoing community and stakeholder participation in marine protected areas management would be enhanced through advisory bodies representing key stakeholder groups and the community. These committees can advise the relevant Ministers and marine protected areas agencies on proposals for marine protected areas; conservation of marine biodiversity and ecologically sustainable use within marine protected areas; matters relating to the application of marine protected areas legislation and planning and management of marine protected areas.

Indigenous participation and support is essential to effectively create, plan and manage marine protected areas.

Pollution

Pollution comes from visible sources such as oil spills, but many little known sources have big impacts, as well. These include polluted runoff, invasive species, marine debris and others. Even fertilisers and pesticides used on lawns and farms contribute greatly to the pollution of oceans.



Julian Rocks, Byron Bay, has been declared a marine sanctuary

Urban polluted runoff

As rain washes over roads, parking lots, construction sites, and industrial or commercial sites, it becomes contaminated with oil and grease, heavy metals, pesticides, litter, fecal matter, and pollutants from vehicle exhaust. This polluted runoff flows into storm drains along roadsides and often ends up in local streams, rivers and coastal waters.

Rural polluted runoff

In rural and even suburban areas, rainwater flows over farmland, roads, golf courses, and lawns into waterways. The rainwater can then become a toxic mix, carrying animal waste, fertilisers, and pesticides.

Sewage treatment plant malfunctions

When too many homes and businesses are hooked up to a sewage treatment plant, it cannot treat the sewage adequately. Moreover, treatment plants can, and often do, malfunction as the result of human error, old equipment, or unusual conditions such as flooding. Under these circumstances, wastewater is released into local waterways and can pollute the oceans.

Septic systems

Dwellings built near the coast may be equipped with underground septic systems, which can leach wastewater into coastal recreational areas. Fecal matter from malfunctioning or overloaded septic systems can contaminate bathing beaches causing sickness. Local governments rarely inspect septic systems sufficiently to prevent such failures.

Boating waste

Improperly handled boating wastes can also affect bathing beaches. Elevated concentrations of fecal coliform have been found in areas with high boating density, such as the Hawkesbury River, Sydney Harbour and the George's River system.

Marine debris

Floating debris regularly washes up on the shores of places as remote as Antarctica, and plastic bottles and bags are routinely seen floating out in mid-ocean. In a single day in 2000, some 850,000 people removed 13.6 million pounds of debris from the world's beach and coastal waters. On that same day, volunteers discovered nearly 13,000 syringes on the world's beaches, and found 373 marine animals entangled in debris.

Entanglement

From dolphins to whales, sea turtles to sea lions, thousands of animals die each year entangled in commercial fishing gear or marine debris. Fishing line and nets, rope and other rubbish can wrap around fins, flippers and limbs - causing drowning, infection, or amputation.

Thousands of marine animals die each year entangled in actively fished commercial fishing gear or in abandoned fishing nets and lines. Several species of dolphins, porpoises and whales are particularly vulnerable to entanglement. Often, these species feed on the same fish that nearby humans are fishing. Other times, they swim with, feed near, or inhabit the same area as those fish.

A Marine Mammal Protection Act is the defence for these species. It requires that teams of specialists develop mechanisms to reduce entanglements and to ensure the continued growth of marine mammal populations.



Green turtle entangled in fishing nets. Photo courtesy of Lance Ferris. Australian Seabird Rescue



Australian pelican with its lower beak entangled in fishing line. Photo courtesy of Lance Ferris.

Invasive species

Hitching rides in the ballast water of ships, invasive species from around the world pour into harbours, bays, estuaries and lakes when cargo is loaded and ballast is dumped. These alien animals and plants threaten native species by competing for food and spreading diseases in new habitats.

Protection of juvenile fish

In an area where juvenile fish tend to gather, restriction of trawling would ensure a reduction in the mortality of younger fish and hence boost adult stock. The banning of commercial fishing and trawling in Botany Bay, Sydney, Lake Illawarra and Lake Macquarie are good examples of attempts to protect the breeding grounds of local fish species.

Threatened species

A major problem for threatened species management is the lack of knowledge on the conservation status of species and the required management actions to take. There is a need to develop appropriate criteria for assessing vulnerability to risk among the majority of marine species that are currently unassessed.

A major issue is the lack of knowledge of the conservation status of some species, the threats to their survival and the management actions that should occur to ensure the survival and, if in decline, the recovery of species. Most information relevant to threatened species management has been acquired by relatively slow discovery and analysis, sometimes boosted by a particular study of a species or issue. With notable exceptions, the management of threatened marine species currently occurs virtually in a vacuum of information which requires reliance upon best practice methodologies

and the precautionary and ecological sustainability principles.

Because of large differences between the marine and terrestrial environment and species characteristics, it is not possible to establish the rarity of most marine species in a similar manner to terrestrial species that is according to the degree of threat to them. There is a need to develop new criteria for use in assessing the great majority of marine species in terms of their vulnerability to risk, and to develop and implement management strategies for identified species as a precautionary measure.

In Australia some of the species which are considered to be threatened include the dugong, marine turtles, some whales and dolphins, fur seals and sea lions, sharks and whale sharks.

Current status of threatened species

Dugongs

Once mistaken for mermaids by lonely sailors, slow-moving dugongs roam and feed on the sea-grass beds of Queensland and Western Australia's northern coastal waterways.

So too do ships and fast-moving recreational boats, which injure and kill dozens of these endangered animals annually. In fact, most dugongs bear scars or deformities from being run over by boats and cut by boat propellers.

Dugongs are listed as endangered under the Endangered Species Act. Although they used to be hunted for their meat, oil and their tough hide, other current human-related threats include entanglement and ingestion of marine debris.

We need to educate residents, visitors, industries and governments to spread the word about dugongs and the need for their protection. We also stress the need to protect and preserve quality habitat so dugongs have places to rest, feed, and mate.

The establishment of the Dugong Protection Areas was a milestone in efforts to save the dugong in the southern Great Barrier Reef and Hervey Bay regions. The areas chosen as Dugong Protection Areas were those with the most dugongs and/or extensive sea grass habitat. In response to declining dugong numbers south of Cooktown, indigenous groups agreed to voluntarily cease traditional hunting in the region. Concern over catch of dugongs in shark nets has led to many nets being replaced with baited hooks. Given the importance of seagrasses as food for the dugong, the management measures taken to protect sea grass habitat will support the dugong conservation program.



Dugong

In response to declining dugong numbers south of Cooktown, the Great Barrier Reef Marine Park Authority recently introduced a dugong conservation program. Sixteen Dugong Protection Areas have been established together with restrictions on fish netting and boating, and greater management focus on protection of the critical sea grass habitat.

A positive result in terms of a rise in numbers from actions to date is likely to be unclear for a decade or more, because the dugong is a long-lived, slow-breeding animal

Marine turtles



Green sea turtle. Photo by Dr. Nicole Duplaix

The marine turtle is a powerful and mysterious creature in many cultures throughout the world. It symbolises longevity, wisdom, tenacity, fertility, strength and protection from harm. In some creation stories it is believed to be the animal on whose back the world was created.

All six species of marine turtles that occur in Australia are listed on Schedule 1 of the Australian Endangered Species Protection Act 1992 as either endangered or vulnerable

The capture and drowning of marine turtles in trawl nets is one of the notable, but manageable, threats to some Australian turtle populations. Fisheries action and management plans have been designed to mitigate marine turtle by catch, and substantial progress has been made towards resolving the issue.

Marine turtles in Australia generally have a tropical and subtropical distribution, with the exception of the leatherback, which can be found in temperate waters. Under the Australian Constitution, the States and Territories have responsibility for wildlife and land management. As marine turtles are protected in State and Territory jurisdictions, the development of a national recovery plan for marine turtles in Australia requires the Commonwealth Government to work in close collaboration and cooperation with representatives of the States and the Northern Territory.

The following threats were identified as having, or were suspected as having, an unacceptable impact on turtle populations: marine debris, indigenous harvesting, trawl fisheries interactions, non-trawl fisheries and boating interactions, shark control activities, predation by feral animals on eggs and loss of habitat.

The mitigation and management of threats to marine turtles in Australia has had several activities occurring in parallel. These include the national recovery plan and plans by various fishing management agencies to address sea turtle by catch in trawl fisheries off northern Australia. The National Recovery Plan has taken advantage of this opportunity upon which to build a coordinated and planned approach to dealing with the complex array of threats to marine turtles, across several jurisdictions and with a diverse range of interest groups.



Baby turtle crawling to the ocean shore

Whales and dolphins

The Whale Protection Act 1980 prohibits killing, capturing, injuring, harassing, chasing and herding whales, dolphins and porpoises in the Australian Fishing Zone (between approximately 3 and 200 nautical miles from the Australian Coastline). The Whale Protection Act gave effect to the growing concern by Australians that the large whale species were being hunted to extinction and needed protection. To further implement the conservation of whales and dolphins, importing whale products and goods containing whale products was banned from January 1981.

The moratorium on commercial whaling has removed a major threat to the whale populations of the world. Many nations have also enacted legislation to protect whales. However, a number of nations still continue to commercially harvest small whales and dolphins, and others have high incidental cetacean mortalities in fishing and netting operations. Japan and Norway continue to resist legislation banning commercial whaling.

Currently the largest killer of dolphins is the incidental catch of dolphins in the eastern tropical Pacific region. In 1987, the fishing industry in this region killed an estimated 115,000 dolphins, with over 6 million being killed since extensive pelagic fishing began almost 30 years ago. Tuna are the main target of this industry, but dolphins become entangled in the purse-seine nets because of their close association with tuna (tuna shadow schools of dolphins). After entanglement, dolphins may drown or receive severe injuries when being drawn through the net hauling mechanisms on the boats. Despite the use of techniques designed to reduce the kill, it remains unacceptably high.

Pollution, particularly from plastics is having an increasingly adverse affect on whales and dolphins. In April 1987, a killer whale stranded on the Australian coast was found to have starved because of the mass of plastic debris in its stomach. Other pollution threats include heavy metals (cadmium, mercury and lead), organochlorines (chlorinated hydrocarbons such as PCBs, DDTs and others), and sewage from coastal communities, oil spills, nuclear waste and fertilisers. Some pollution has an indirect affect on whales and dolphins by changing the marine environment. As the top of the marine food chain, whales and dolphins may be found to contain higher concentrations of heavy metal and chemical pollutants than other species in the ecosystem. They are particularly susceptible to accumulation of heavy metals and organochlorides because of their high blubber content, and their lack of metabolic enzymes to break down these substances.

Other potential threats include over-fishing of krill in the Southern Ocean and interaction with shipping. Urban and industrial development on coasts and estuaries has a detrimental impact on dolphins living in coastal waters.

Our Society opposes the killing of whales, dolphins, and porpoises for commercial and scientific purposes. At the same time, we acknowledge the needs of indigenous, aboriginal and native people involved in subsistence hunting for survival.



Humpback whale

In spite of more than fifty years of management by the International Whaling Commission (IWC) most whale species have yet to fully recover from the devastating effects of the commercial whaling industry. There is a loophole for countries, such as Japan, to undertake commercial whaling under the guise of unregulated, and potentially unsustainable, scientific whaling. Scientific experts have repeatedly expressed concern over the research programs conducted under this loophole. There is also a need to address the taking of small whales and dolphins, because whaling nations have started hunting, taking more than 20,000 of these creatures annually.

Fur seals and sea lions

The main distinction between fur seals and sea lions is that fur seals have two layers of hair; an inner fine fur and an outer coarse hair. Sea lions have only one layer, which is why they weren't hunted as much.

The fur seal colonies extend from Kangaroo Island to Flinders Island (near Cape Leeuwin) in Western Australia, although 70 per cent of the population is in the central South Australian waters from Kangaroo Island to the southern tip of Eyre Peninsula.

Factors causing the precipitous decline of sea lions are still under debate. Scientists and managers have evaluated numerous potential causes, including disease, pollution, entanglement in marine debris, commercial and subsistence harvests, predation by whales and sharks, illegal killing, natural environmental changes in carrying capacity, and interactions with commercial fisheries. The leading hypothesis explaining the decline is that the sea lions are nutritionally stressed, either from a natural ecosystem change or from competition with commercial groundfish fisheries. It is likely that multiple factors have contributed to the decline.



Fur seal pup

Studies are being carried out to identify the interaction between fur seals, sea lions and the fishing industry, in the hope of reducing the number of marine mammals caught in nets. Often the seals caught in nets have been attracted to the area by unwanted fish discarded by trawler crews. It is a big problem, although one answer may be the addition of a steel grid to stop seals being drawn into the bottom of the net with the fish.

Legislation is needed to protect sea lions. We need to ensure that governments use the best available science when allowing fishing in sea lion critical habitat and that it isn't allowing localised depletion of important prey species when allocating allowable catch each year.

Establishing marine sanctuaries will keep sea lions out of deadly fishing nets and protect over fishing.

The changing fortunes of Australia's rare fur seals and sea lions highlight the precarious juggling act required of biologists when they try to protect different species occupying the same habitat.

Over the past few decades marine biologists have managed to pull fur seals back from the brink of extinction, but now have to balance the success of this operation with its possible impact on the equally rare Australian sea lions.



Fur seal numbers are increasing at a time when the food supply they share with sea lions - fish and squid - appears to be diminishing and sea lion numbers have mysteriously stalled. Australian sea lions are unique and only found off South Australia and Western Australia and at last count in the mid-1990s totalled a mere 2,000.

Small, stationary, populations are always the most vulnerable. We urgently need to find out why sea lion numbers have levelled off. Data collected suggest that too many pups are dying and we don't really know why. Possible causes of death include parasites, such as hookworm, environmental disturbance causing a food shortage for lactating female sea lions, high rates of aggression by adult males, direct human harassment or by entanglement in fishing gear.

But the most worrying possibility is that sea lions may be facing stronger competition for food from the fur seals, whose numbers have been increasing at an annual rate of around 10 percent. The Australian sea lion is an endemic species that we need to take care of. It is a tourist icon, up there with the koala, and attracts tens of thousands of visitors to the sea lion colonies every year. If we don't find out why their numbers are not increasing, we may face more serious problems later on.

Conflicts with fisheries still pose a great threat, however, and there are concerns that these will increase as the population recovers. Australian fur seals are attracted to fish in static and, less commonly, trawl fishing nets and many are drowned in nets and traps or shot by fishermen and fish farmers. Fishermen in Victoria also claim that fur seals are drastically reducing commercial fish stocks but this is not substantiated by scientific evidence. Increased disturbance and increased pollution of Australian fur seal habitat with pesticides and heavy metals are additional threats to the population.

The attraction of mainly subadult and adult male fur seals to fish farms in southern Tasmania has caused particular problems. In October 2000 it was revealed that, despite their protected status, the Tasmanian Government allowed the killing of Australian fur seals that were deemed to be a hazard to fish farms and commercial fishermen. The decision came after strong pressure from the fishing community following events in which increasingly bold male fur seals were said to have been aggressive towards fishermen and fish farmers. A new "three strikes" protocol resulted in offending fur seals being tagged and transported to waters on the other side of the island but euthanased by a vet if caught twice more.

A commercial fisherman in New South Wales applied for a licence in January 2000 to shoot Australian fur seals and New Zealand fur seals

sharing his fishing grounds around Montague Island. Officials said however that there was very little chance of the licence being granted due to the seals' worth to the local economy through ecotourism, the ineffectiveness of such killing and the danger to the public of any shooting.

In December 1998 authorities investigated the killing of at least 16 decapitated Australian fur seals, mostly pups, found on King Island in Bass Strait, and a further 6 dead fur seals found on Tasmanian beaches, some of which were decapitated. A local police source said that they believed that the number of seals found was only a fraction of those killed, and that someone had gone ashore at the nearby Reid Rocks colony, which was in the midst of its pupping season, and shot the seals before decapitating them.

It was revealed in June 2000 that the Federal Government allowed two ships trawling for blue grenadier in western Bass Strait off Tasmania to kill up to 30 Australian fur seals and New Zealand fur seals each in their nets, a measure taken in response to the two ships together killing 87 fur seals in 1999.

We believe the killing of fur seals in trawl nets is unacceptable and we urge the development of effective marine mammal exclusion devices in the trawl nets. Some testing of seal exclusion devices was carried out by the blue grenadier fishery during the 2000 season.

Fears have recently been raised that Australian fur seals could be harassed, or swimmers could be injured, as a result of the growing commercial seal swim industry. The additional problem of swimmers being attacked by hungry sharks that are attracted to the seals has also been highlighted.



Sea lion. Photo by Dr. Ellen K. Rudolph

Sharks

Sharks have ruled the seas since long before the time of the dinosaurs. Often mislabeled as “man-eaters,” these apex predators have been feared for centuries. Today, they face their first real threat - humans. Sharks live in oceans around Australia - from warm shallows to the cold, deep sea and even fresh water lakes.



Shark

Shark diets vary by species. The largest sharks (such as whale sharks) feed on tiny fish and plankton. White sharks prey upon sea lions and tiger sharks feed on sea turtles. Most sharks, however, eat a variety of fish and invertebrates. Humans are not part of any shark's natural diet. On the other hand, people eat a variety of sharks. Australians fish for school and gummy sharks. Worldwide commercial fishermen target more than 100 different shark species and catch and destroy many more unintentionally.

Despite their fierce image, sharks are among the most vulnerable creatures in the ocean. Sharks grow slowly, mature late, and bear few young. These traits hamper sharks' ability to recoup losses incurred from commercial fishing. Too often, shark fisheries expand quickly without limit only to end in rapid collapse. Today, few if any shark fisheries are adequately controlled and many species around the world are seriously overfished or even in danger of extinction. Depleted shark populations often require decades, even centuries, to rebuild.

Sharks have been hunted for thousands of years. Today they are sought for their meat, fins, oil, teeth, hides and even their cartilaginous skeletons. In recent decades, many shark populations worldwide have suffered severe declines due to overfishing. In addition to intentional catch, millions of sharks are killed each year as “by catch”, caught “incidentally” in fisheries targeting other species. Sharks also fall victim to finning, the abhorrent practice of slicing off a shark's fins and tossing its carcass back into the water. Dried fins fetch a high price and are used to make the Asian delicacy shark fin soup. The degradation of nearshore habitat, which many sharks use as safe places to give birth and grow up,

also poses a threat to coastal shark populations. Overall, sharks still have relatively low economic value and are often regarded as menaces, pests or trash, making them a low priority for fishery managers. Despite the highly migratory nature of most sharks, there is currently no international management for sharks. Scientific knowledge of sharks and their population status is limited and yet an essential part of effective conservation.

Sharks are in dire need of management, but shark conservation programs will not proceed without public support. Our voice for long-term conservation is vital to balance short-term interests. There are many things we can do to help the sharks, such as contacting environmental ministers to ask them to support shark research and management programs on state, national and international levels. Please write now.

Grey nurse shark

The grey nurse shark, estimated to number less than 300 off the east coast, is the most critically endangered fish species in New South Wales - and their numbers appear to be declining. It is a harmless shark, which has never been responsible for a shark-related death. It has narrow, inward pointing teeth that are only suited to catching fish. The New South Wales Government has banned some practices such as moored fishing with wire trace, but has left the critical habitats open to a considerable range of both recreational and commercial fishing, ignoring recommendations from scientific experts, professional divers and conservationists that called for 1,000m exclusion zones. In doing so, they have failed to adequately protect the grey nurse, their young and food from the major threat to their survival - fishing. Accidental hookings are killing grey nurse sharks. Fishing activity, particularly recreation line fishing, is thought to be impacting severely on the existing shark population.

Whale shark - the largest living shark

This species is rare. Prior to the mid 1980s there had been less than 350 confirmed reports of whale sharks worldwide. Since this time, consistent sightings have been recorded in Australia. A lucrative ecotourism industry revolving around their annual appearance at Ningaloo Marine Park on the Western Australian northwest coast is now well established. Australia is one of the most reliable locations to find whale sharks. Their habit of swimming at the surface makes the whale shark particularly susceptible to fishing pressure.

The most significant threat to the species appears to be humans.

In Western Australian waters the whale shark is fully protected under the Wildlife Conservation Act 1996 and the Fish Resources Management Act 1994. The whale shark is listed on the Bonn Convention for the Conservation of Migratory Species. This identifies the whale shark as a species whose conservation status would benefit from the implementation of international cooperative agreements. As a species protected in Australian waters, international cooperation is needed to limit trade in whale shark products.



Diver with whale shark

Sustainable fishing

For millenia, humans have drawn a rich bounty from the oceans. Seafood provides vital protein to millions of people, and important health and nutritional products are derived from kelp and other sea plants.

Fish has been a mainstay in the diet of many cultures and fishing is a skill passed down through generations. Generally, small-scale fisheries that provide sustenance for a family or community are the most sustainable. Problems arose with the advent of large, industrialised commercial fishing fleets around the world that take more than the oceans can sustain.

Today, globally, we are fishing so hard that stocks are becoming depleted and in some cases whole populations of fish are disappearing. Overfishing, pollution and habitat loss have driven many ocean species to the edge of extinction.

Too often, scientific advice, and at times traditional and local ecological knowledge, has been ignored in order to maintain large-scale unsustainable fisheries. In many cases, the fisheries themselves and the long-term sustainability of a particular fishing industry have fallen victim to such short-sightedness. Tuna fishing along the east coast of Australia is such an example.

Through scientific understanding and research that acknowledges social and ecological issues; we can learn how to better manage fisheries so that fish stocks and fishing communities are healthier

and sustainable for generations to come. The efforts of governments, business, communities and concerned individuals are essential if we are to maintain and enhance fish stocks and conserve vital ocean habitats and ecosystems.

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted; the fishery must be conducted in a manner that demonstrably leads to their recovery. It is imperative that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests.

The western rock lobster - an example of sustainable fishery

The western rock lobster fishery centered around Geraldton in Western Australia is the most valuable single-species fishery in Australia and usually represents about twenty per cent of the total value of Australia's fisheries. It was also one of the first fisheries in the world to be certified as ecologically sustainable by the Marine Stewardship Council.

Also called "crayfish" or "spiny lobsters", rock lobsters are exported mainly to South East Asia, USA and Europe, commanding high prices.

The heavy exploitation rate in the fishery requires a continuous intensive research and management program to maintain the lobster population.

As one of the first managed fisheries in Western Australia, data has been kept on the western rock lobster fishery since the early 1960s. This powerful database enables fisheries scientists to predict catches accurately and fisheries managers to ensure controls are adequate to protect breeding stocks and the sustainability of the fishery.

Eight species of rock lobster are found off the Western Australia coast. However, virtually the entire catch consists of the western rock lobster *Panulirus cygnus*, caught up to 60km off the coast between Augusta and Shark Bay.

There are three major zones in the fishery, with fishing controls attuned to the annual lobster population, environmental factors and migration patterns.



Suzanne Medway inspecting lobster tanks at the rock lobster factory in Geraldton Western Australia



Aerial roots of the mangrove trees

The western rock lobster fishery was declared limited entry in March 1963 when licence and pot numbers were frozen. The sustainable catch is estimated at between 10,000 and 15,000 tonnes per year, although the size of the actual catch has varied between 8,000 tonnes and 14,500 tonnes.

During the open season between 15 November and 30 June each year, lobsters are fished using baited pots (commercial diving for lobsters is banned) although the Abrolhos Islands area stays closed until 15 March.

The aim of fishing controls is to ensure that the numbers of breeding lobsters are maintained to support this valuable fishery. Fisheries managers, industry and researchers work together to achieve this.

It is illegal to take mature females which are setose (having distinct hairs on the swimmerets under their tails, indicating breeding condition) or carrying eggs or tar spots (sperm packets).

Despite increasing coastal development and resulting pollution, Western Australia's coastal waters (including nursery grounds), remain clean, ensuring western rock lobsters of extremely high quality.

Mangroves

Mangrove forests are one of the most productive and biodiverse wetlands on earth. Yet, these unique coastal tropical forests are among the most threatened habitats in the world. They may be disappearing more quickly than inland tropical rainforests and, so far, with little public notice.

Growing in the intertidal areas and estuary mouths between land and sea, mangroves provide critical habitat for a diverse range of marine and terrestrial flora and fauna. Healthy mangrove forests are the key to a healthy marine ecology.

