Australian Government
Bureau of Rural Sciences

SCIENCE *for* DECISION MAKERS

FEBRUARY 2008

Managing Interactions between Humans and Seals

A National Seal Strategy to minimise adverse interactions between humans and seals in the fisheries, aquaculture and tourism sectors

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Science for Decision Makers is a series published by the Bureau of Rural Sciences. It describes the latest developments in scientific advice, assessments or tools relating to agricultural, fisheries and forestry industries, including their supporting communities.

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Key Points

1 Humans and seals[1] interact in a number of ways that may adversely affect the seals or humans or both. Interactions are of particular concern in the fisheries, aquaculture and tourism sectors; they may result in economic loss or injury to humans. For seals, interactions may result in stress, changed behaviour, injury or death.

2 Seals are protected under Australian government and State government legislation.

3 Since 1975, many fur seal populations have begun to recover from over-harvesting that took place during the late eighteenth to early twentieth centuries, and our commercial fishing, aquaculture and tourism industries have developed significantly. It is therefore likely that interactions between humans and seals will continue to increase in these sectors.

4 The challenge facing governments and industry is how to minimise adverse interactions while protecting seals and maintaining sustainable and profitable businesses.

5 A national strategy has been developed that identifies objectives and actions to minimise adverse impacts on Australian seal populations and on the fisheries, aquaculture and tourism sectors.

[1] For the purpose of this report, 'seal' or 'seals' refers to Australian and New Zealand fur seals and Australian sea lions, unless otherwise stated.

The issue

Commercial fishing, marine aquaculture and marine-based tourism are valuable, and growing, sectors of Australia's economy. For example, in the 2005–06 financial year, Australia derived A$1385 million from commercial fishing and at least A$377 million from marine finfish aquaculture. These industries may interact[2] with the seal populations that live on Australia's southern coasts, adversely affecting the seals or humans or both.

Seals are charismatic creatures, and reports of them being injured or killed arouse public concern. As they are also protected species, seal mortalities resulting from interactions with fisheries, aquaculture or tourism can have negative political and socio-economic impacts on these industries. Such mortalities may also affect seal populations, and large losses of these predators at the top of the food chain could impact on marine ecosystems.

Human–seal interactions in Australian polar and subpolar territories are much less frequent than on the coasts of continental Australia, where human activities are more numerous. This report focuses on the species that live and breed on these coasts—and that consequently interact most often with fisheries, aquaculture and tourism: the Australian sea lion *Neophoca*

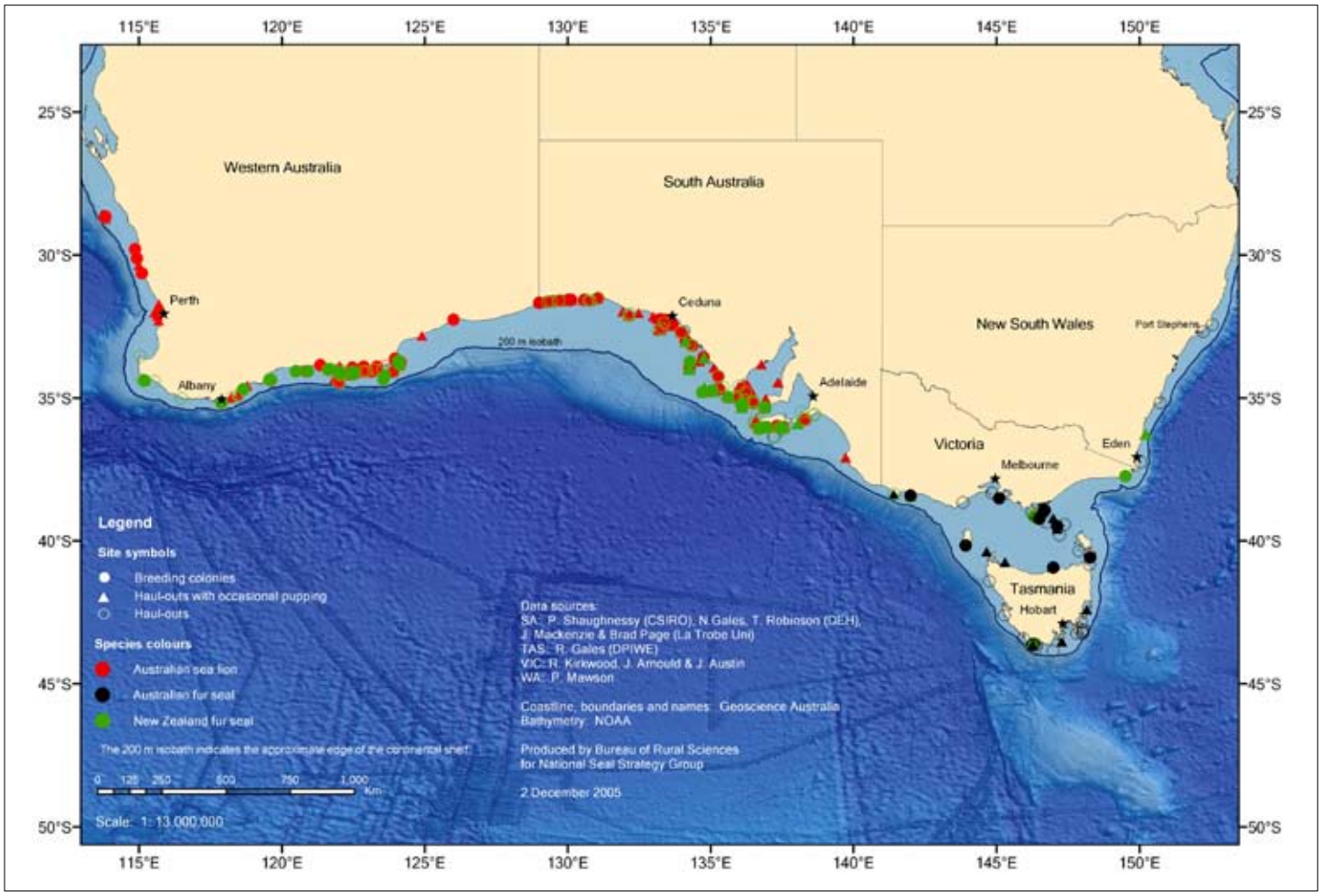


Figure 1: Distribution of Australian sea lions, Australian fur seals and New Zealand fur seals in southern Australia, excluding external territories: breeding and haul-out sites.

Definitions for sea lions: (i) breeding colony: has at least 5 pups recorded during at least one survey over the past 20 years; (ii) haul-out with occasional pupping: has 1–4 pups recorded during at least one survey over the past 20 years; and (iii) haul-out site: sites that are frequented by sea lions.
Definitions for fur seals: (i) breeding colony: has at least 15 pups recorded during at least one survey over the past 20 years; (ii) haul-out with occasional pupping: has 1–14 pups recorded during at least one survey over the past 20 years; and (iii) haul-out site: sites that are frequented by fur seals.
Haul-outs exclude man-made infrastructure, such as bell-buoys and oil-rigs.

[2] For fisheries and aquaculture, interactions can be operational (seals interact with fishing gear that may be detrimental to the seal, fishers or both) or ecological (indirect competition for common prey species). This report examines only operational interactions.

cinerea, Australian fur seal *Arctocephalus pusillus doriferus* and New Zealand fur seal *A. forsteri* (Figure 1). Two seal species that visit and occasionally breed on the southern coasts of the continent—leopard seal *Hydrurga leptonyx* and elephant seal *Mirounga leonina*—are not included, but may also interact with humans, particularly in Tasmanian salmonid farms.

There is some overlap between prey species of seals and species of interest to commercial fisheries and marine-finfish farm operators. This overlap can lead to adverse interactions because competition for the same resources (fish, squid and crustaceans), and attempts by seals to obtain food from fishing gear or aquaculture pens, can lead to seals becoming entangled and trapped, which can result in injury or drowning of seals in trawl nets, gillnet, lobster pots and aquaculture nets.

Protected under legislation since 1975, many Australian and New Zealand fur seal populations are now recovering from being hunted for their fur (and blubber) during the late eighteenth to early twentieth centuries (this recovery is not evident for Australian sea lion populations). A combination of increasing seal numbers in some areas; an overlap between the feeding ranges of seals and some fishing and aquaculture industries; and the expansion of commercial marine and tourism operations, has created potential for more frequent interactions between seals and marine industries.

The challenge facing governments and industry is how to minimise adverse interactions so as to protect seals while at the same time maintaining sustainable and profitable businesses. To meet this challenge, it is important that the nature of interactions is well understood and appropriately measured to determine what, if any, action is necessary.

Three species of seals breed in continental Australia:
(a) Australian sea lion, © Brad Page;
(b) Australian fur seal, © Brad Page; and
(c) New Zealand fur seal, © Ken Hoppen.

All seals are protected nationally

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), all seals are listed species—they are protected to help ensure their long-term survival. It is an offence to kill, injure, take, trade, keep or move a seal on Australian Government land and in Australian Government waters unless the action is covered by a permit issued by the Minister for the Environment, Water, Heritage and the Arts.

The Australian sea lion is also listed under the *EPBC Act (1999)* as 'Vulnerable'—it is facing a high risk of extinction in the wild in the medium-term future. Genetic and breeding asynchrony data suggest that most Australian sea lion populations are closed, and female dispersal is minimal. Small, closed populations are highly vulnerable, especially to increased mortality owing to anthropogenic causes. The *EPBC Act (1999)* requires that any action that has, will have, or is likely to have a significant impact on vulnerable species must be referred to the Department of the Environment, Water, Heritage and the Arts—this applies in States and Territories as well as to Australian Government land and waters. The *EPBC Act (1999)* also requires that recovery plans for listed threatened species be developed within specified time frames from the time of listing.

TABLE 1 Australian Government and State Government legislation relevant to the survival status of the Australian sea lion, Australian fur seal and New Zealand fur seal

Jurisdiction	Authority	Act	Listing/Category
Australian Government	Department of the Environment, Water, Heritage and the Arts	*Environment Protection and Biodiversity Conservation Act, 1999*	*Listed Marine Species* All seals and sea lions *Vulnerable* Australian sea lion
Western Australia	Department of Environment and Conservation	*Wildlife Conservation Act, 1950*	*Protected* All seals *Specially Protected* Australian sea lion New Zealand fur seal
South Australia	Department for Environment and Heritage	*National Parks and Wildlife Act, 1972*	*Protected* All seals *Rare* Australian sea lion Australian fur seal
Victoria	Department of Sustainability and Environment	*Wildlife Act, 1975*	*Protected Wildlife* All seals *Notable Wildlife* Australian fur seal
Tasmania	Department of Primary Industries, Water and the Environment	*Wildlife Regulations, 1999 (Schedule 1)* *Threatened Species Protection Act, 1995* *Nature Conservation Act, 2002*	*Specially Protected Wildlife* Australian fur seal New Zealand fur seal Australian sea lion *Rare* New Zealand fur seal
New South Wales	NSW National Parks and Wildlife Service	*Threatened Species Protection Act, 1995*	*Vulnerable* Australian fur seal New Zealand fur seal

In addition to the *EPBC Act (1999)*, some seal species are protected under State and Territory legislation (Table 1). State conservation and/or fisheries agencies are responsible for seals on land and in waters up to 3 nautical miles (5.6 km) off-shore, while the Australian Government is responsible for seals beyond State coastal waters and within the Australian Economic Exclusion Zone. Generally, the Australian Government waters stretch from 3 to 200 nautical miles (370.4 km) from the coast.

Fur seals are recovering from over-harvesting

Commercial sealing began soon after Matthew Flinders recorded the presence of fur seals along the southern Australian coast in 1798. By 1830, fur seals and sea lions were reduced to very low numbers throughout most of southern Australia, and disappeared from some sites[3]. Based on records of seal skin cargoes landed at Sydney, at least 200 000 fur seals were taken from the Bass Strait region between 1798 and 1825.

Australian and New Zealand fur seal populations remained at low levels until the 1970s and 1980s. Since then, the populations in southern Australian have been recovering strongly—to about 92 000 of the former and 96 000 of the latter—though they have not reached pre-sealing numbers, and some haul-out and breeding sites have not been reoccupied since commercial sealing ended.

The total population of Australian sea lions is currently estimated to be about 14 000. Abundance and trend data for this species are relatively poor; hence, there is considerable uncertainty as to their status, but it is know the present population size and the species' range are less than in pre-sealing times.

Sealers' hut in Westernport, Victoria (1833). [Lithograph with later hand colouring by Langlume (1833). *Habitation de pecheurs de phoques au Port Western (Nouvelle Hollande)*. H90.20/2, State Library of Victoria].

[3]The elephant seal population was exterminated from Bass Strait and has not re-established.

Interactions: Fisheries and seals

Fisheries and seals interact in both Australian Government and State Government-managed fisheries, notably in the Commonwealth Trawl Sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF); the Gillnet, Hook and Trap Sector of the SESSF; and the Southern Squid Jig Fishery. In the 2005–06 financial year, these fisheries caught (live weight) 23 299 t of finfish, 202 t of crustaceans and 1 586 t of molluscs (including 1 370 t of arrow squid) valued at A$66 million.

There are few quantitative and independent data on the nature and extent of interactions between fisheries and seals. The detrimental impacts on fishers that result from interactions include:

- damage to and loss of gear
- damage to and loss of catch
- disruption of fishing operations
- injuries to fishers
- poor public image of fishers arising from seal injuries and mortalities (the community disapproves of activities that harm seals).

Furthermore, some people believe that seals can have significant impacts on prey populations, some of which are of interest to commercial fisheries; however, the issue of ecological interaction is not the focus of this paper.

BOX A

SLEDS REDUCE INTERACTIONS WITH SEA LIONS IN THE AUSTRALIAN WESTERN ROCK LOBSTER FISHERY

A small population (800–900) of the vulnerable Australian sea lion lives along the mid-west coast of Western Australia, their range overlapping with the rich fishing grounds for the western rock lobster. Some sea lion pups have become trapped in lobster pots and drowned. Sea lions are slow to breed—a female has only one pup every 18 months—and usually return to the same sites to breed. This makes small local populations highly vulnerable; therefore, seal pup drownings in lobster pots need to be prevented.

- The Department of Fisheries (Western Australia), in partnership with the western rock lobster fishing industry, has engineered a device to keep sea lion pups out of the pots but allow rock lobsters in.
- The sea lion exclusion device (SLED) is an upright bolt fitted to the base of the pot, rising towards its neck. The best configuration is where the bolt head is set 20 mm below the neck of the pot.
- This simple and cheap device was made mandatory for commercial and recreational fishers in the 2006–07 fishing season working in the shallow waters (0–20 metres) between Dongara and Lancelin, from where sea lion pup fatalities have been reported.
- A second type of SLED, in the form of a batten across the neck of the pot, will also keep out sea lion pups, but may also reduce the lobster catch. Because it is simple to fit and remove, it is preferred by some fishers, so a choice of devices is permitted.
- Video monitoring, commercial field trials and outcomes from the first season of implementation in the fishery have confirmed that these devices are highly effective; there have been no reports of sea lion pup mortalities in pots fitted with SLEDs.

Sea lion exclusion device (SLED)—an upright bolt fitted to the base of the lobster pot, rising towards the neck of the pot to keep sea lion pups out but allow rock lobsters in. © Richard Campbell.

The detrimental impacts on seals that result from interactions include:

- being entangled or trapped in fishing gear (bycatch) leading to injuries and fatal drownings
- changes in behaviour (e.g. when human activities such as fishing make food available, which supplements or becomes an alternative to natural foraging)
- harassment and deliberate killing or injury by fishers (e.g. illegal shooting)
- entanglement in fisheries-related debris (e.g. discarded nets, bait-box straps, ropes)

Interactions: Aquaculture and seals

Interactions between marine finfish aquaculture operations and seals are most evident in salmonid (Atlantic salmon and rainbow trout) farms in Tasmania and southern blue fin tuna farms in South Australia. In the 2005–06 financial year, these farms produced (live weight) 19 219 t of salmonids valued at A$221 million and 8806 t of tuna valued at A$156 million.

Although there is little published information on the nature and extent of interactions between aquaculture operations and seals, it is more extensive than for wild fisheries. The detrimental impacts on aquaculture operations that result from interactions include:

- loss of production (e.g. through disturbance of stock, death of stock through predation, escape of fish stocks)
- damage to pens and gear
- increased costs of protecting stock (e.g. by barriers, relocation)
- human injury (bites from seals)
- poor public image of fishers arising from seal injuries and mortalities (the community disapproves of activities that harm seals).

The detrimental impacts on seals that result from interactions include:

- injuries and fatal drownings when seals become entangled in fish-farm nets or trapped in cages
- harassment or deliberate killing of seals (e.g. illegal shooting)
- changed behaviour (e.g. habituation to a predictable food source).

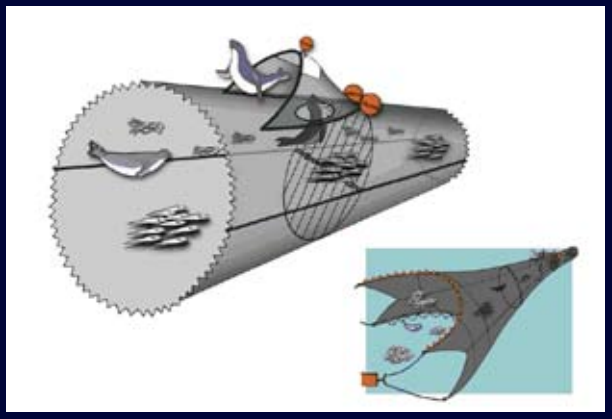
Interactions between fisheries and seals are varied and may result in economic loss to fishers, or injury and death to seals entangled or trapped in fishing gear. © Roger Kirkwood.

BOX B

SEAL EXCLUSION DEVICES TO REDUCE SEAL BYCATCH IN THE COMMONWEALTH TRAWL

Freezer trawlers entered the Commonwealth Trawl Fishery of the Southern and Eastern Scalefish and Shark Fishery in 1997. In 1999, an estimated 83 seals drowned in interactions with three of these freezer vessels, prompting the development of a program to reduce seal bycatch in this fishery. The principal components of this program are an Industry Code of Fishing Practice aimed at avoiding seals, and trials of Seal Exclusion Devices (SEDs) in trawl nets.

- SED trails were conducted on two of the large freezer trawlers in the fishery from 2000 to 2003.
- The initial SED design used in 2000 had much in common with the Turtle Exclusion Devices used in prawn fisheries, with a square, backward-sloping exclusion grid and a backward-facing escape hatch on top of the net sleeve.
- The SED was refined and, by 2002, a forward-facing 'top-hatch' SED was developed.
- Although the 2002 top-hatch SED was shown to catch significantly fewer seals as bycatch than other SED designs and nets without a SED, the performance of the SED is largely unquantified. The actual number of seals entering the trawl net and successfully exiting the net via the SED escape hatch is unknown.
- The use of SEDs clearly enhances the survival rates of seals by preventing entry into a net's codend, where most seal drownings probably occur. However, a higher incidence of seals in nets with a SED suggested that some seals may be entering the net via the SED escape hatch. An overall (2000–2003) seal bycatch survival rate of 48 per cent was observed in mid-water nets with an 'open SED escape hatch', compared with zero per cent for nets without a SED.
- Trials of the use of SEDs, such as the 'top hatch' SED that is used in the winter blue grenadier fishery, have proved their worth and are mandated by Australian Fisheries Management Authority for use in the trawl nets of all vessels capable of freezing or processing at sea.
- There have been no trials of SEDs on the smaller wet boats (fishing vessels that store fresh fish on ice or brine) in the Commonwealth Trawl Fishery of the SESSF. Until such trials are undertaken, the value of using SEDs to reduce the capture of seals on these smaller boats is unknown.



Seal exclusion device in a trawl net to allow seals to escape out of the forward-facing top hatch.
© Martin Cawthorn.

BOX C

REDUCING INTERACTIONS WITH SEALS ON SALMON FARMS

Various measures have been used in salmonid farms to reduce adverse interaction with seals, but with varying degrees of success. The following are the most successful mitigation measures used on salmonid farms in Tasmania:

- Well-maintained stock nets.
- Structural modification of nets: appropriate net mesh size; false bottoms on nets; spectra or dyneema framleinge net material; and tensioning of the stock net and predator net.
- Structural modification of pens: system farms[4] that use square or rectangular pens are easier to protect from seals than the round Polar Circles. The tension required to keep the nets seal-proof is achievable with square pens, but much more difficult with round ones. Maximising the tension weight (20 per cent of available buoyancy) and maintaining a buffer distance of at least 2 metres between predator and grow-out nets is recommended.
- Wire nets instead of conventional fibre nets: MarineLive™ is a brass alloy, woven-wire netting that is most suitable for system farms. A single layer of MarineLive™ acts as both a grower and predator net, replacing the need for multiple fibre nets (contact manufacturer for details). MarineLive™ is unsuitable for use on conventional circular pens, or for exposed sites subject to strong wave action.
- Fences and railings up to 1.5 metres in height: to prevent seals interacting with farm personnel and entering pens.
- Aerial netting: to prevent seals from interacting with farm personnel and entering pens.
- Electric fencing: moderately effective when used with other measures and with system farms; ineffective at exposed sites subject to strong wave action.
- Trapping and relocation as a temporary measure and short-term management tool: under the 1998 system of accreditation, only farms that meet certain standards are permitted to trap seals. This method is most effective when seals have entered pens. Translocation as a primary protection method will be phased out when better management tools become available.
- Sedation and removal: used under exceptional circumstances.
- Seal crackers: crackers are effective under certain circumstances when used properly. Trained farm workers are authorised to use these small explosives providing they follow a code of practice. Use of non-lethal deterrents requires permits, training and adherence to deployment protocols.

[4]System farms are generally made up of several square or rectangular cages, configured in a grid pattern, sharing a floating platform of walkways that provide access around each cage.

New Zealand fur seal on the pen collar of a salmonid farm, Tasmania. © Sue Robinson.

Interactions: Tourism and seals

Seal-focused tourism is popular and increasing. It includes organised seal watching on boat cruises, guided tours on-shore, and swimming and diving with seals. It also includes visits to seal colonies and haul-out sites that are not part of a commercially organised tour. The financial benefits to the local economy are substantial, and there are educational and recreational benefits to the tourists. However, large group size, noise and the desire to 'get close to wild animals' may result in tourists unintentionally disturbing seal populations. This can also happen when recreational beach walkers, fishers, divers and boat users have unplanned encounters with seals.

Detrimental impacts on tourists of interactions with seals are apparent in both 'swim-with' and land-based tours. The risks include seal bites (or other injuries) and, when swimming or diving near seal colonies, an increased risk of shark attack.

Detrimental impacts on seals of interactions with tourists include interference with resting, socialising or breeding; displacement from optimal habitat; the potential for transmission of disease; changed behaviour of seals (e.g. habituation to a predictable food source); and in severe cases, injury and mortality of small pups.

National seal strategy

In 2003, the Marine and Coastal Committee of the Natural Resource Management Standing Committee established an inter-government working group—the National Seal Strategy Group—to initiate a coordinated national approach to managing human–seal interactions.

In consultation with stakeholders, the National Seal Strategy Group developed a National Strategy that aims to make the commercial fishing, aquaculture and tourism sectors aware of the legislation protecting seals in Australian waters, and guide industry efforts to reduce adverse impacts on seals while maintaining the economic and ecological sustainability of those industries.

The National Strategy identifies objectives and actions for the period 2007–2011; agencies and organisations responsible for each action; timeframes; and performance indicators against which to measure progress and outcomes for each action.

Background information to support the Strategy was published in the document *National Assessment of Interactions between Humans and Seals: Fisheries, Aquaculture and Tourism*.

BOX D

WHERE TO OBSERVE SEALS

Some of the better-known, organised viewing sites are Port Phillip Bay and Seal Rocks–Portland (Victoria); Seal Bay on Kangaroo Island, Baird's Bay and Point Labatt (South Australia); Montague Island (New South Wales); Carnac Island Nature Reserve (Western Australia); and the Friars on Bruny Island, Tasman Peninsula and Iles des Phoques (Tasmania).

Tourists diving with Australian fur seals at the Skerries, Victoria. © Ken Hoppen

The National Seal Strategy was endorsed by Natural Resource Management Ministerial Council in November 2006. The Assessment Report and the National Seal Strategy were subsequently launched in March 2007. They are publicly available at: www.daff.gov.au/fisheries/environment/bycatch/seals

Implementation of the national seal strategy

Actions in the National Seal Strategy have been assigned to Australian and State Government agencies, industry-specific bodies and industry extension services. They have been documented according to industry sector (fisheries, aquaculture and tourism) under four broad objectives:

(i) obtain quantitative and independent data on the nature and extent of interactions between industry and seals
(ii) minimise and mitigate adverse interactions between industry and seals
(iii) develop and implement robust arrangements to report interactions between industry and seals
(iv) encourage industry to embrace stewardship of the marine ecosystem.

Performance indicators and timelines have been specified for each action.

In July 2007, the National Seal Strategy Implementation Group was formed to progress actions outlined in the Strategy. The Group, a sub-committee of the Natural Resource Management Marine and Coastal Committee, is made up of members from the Australian Government (Department of Agriculture, Fisheries and Forestry; Department of the Environment, Water, Heritage and the Arts; Australian Fisheries Management Authority; and Department of Industry, Tourism and Resources); State Governments (Western Australia; South Australia; Tasmania; Victoria; and New South Wales); and government science organisations (Bureau of Rural Sciences; South Australian Research and Development Institute; and Australian Centre for Applied Marine Mammal Science).

The Group will oversee the implementation and communication of the National Seal Strategy, and report progress annually to the Marine and Coastal Committee. It will engage with stakeholders, and after November 2011 will initiate and oversee a review of the National Seal Strategy to assess progress made (against performance indicators) and consolidate advances in knowledge.

To achieve a nationally coordinated approach that minimises adverse impacts on seals while maintaining sustainable and profitable industries, the Strategy must ensure:

- national policy leadership is developed through inter-government initiatives
- ecologically sustainable practices are adopted by industry
- conservation groups, researchers and members of the public are encouraged to contribute
- activities and achievements are communicated nationally.

Conclusions

The National Seal Strategy provides the means to identify and minimise adverse impacts on seals while maintaining sustainable and profitable industries. A partnership between governments, industry, non-government organisations and the public is essential to progress the Strategy effectively and within the agreed timeframes. Accurate measurements and reports on the effects of actions, including the identification of any impacts on industry and seal conservation, are required to determine the effectiveness of the Strategy when it is reviewed in 2011.

Acknowledgements

The authors thank members of the National Seal Strategy Implementation Group (and the former National Seal Strategy Group) and the following individuals—James Findlay, Sandy Morison, Phil Sahlqvist, Rupert Summerson, Pheroze Jungalwalla, Katrina Phillips and Vivienne Mawson—for constructive comment and support. Richard Campbell is gratefully acknowledged for providing the summary of the Western Rock Lobster Fishery SLED program. Simon Goldsworthy, Roger Kirkwood and Nick Gales are thanked for providing updated seal population estimates for 2007.

LEFT: Australian sea lions—adult female with pup. The species is listed as 'Vulnerable', © Brad Page.

Further reading

Department of Agriculture, Fisheries and Forestry http://www.daff.gov.au/fisheries/environment/bycatch/seals

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Fishing vessel and New Zealand fur seal, © Brad Page

FRONT COVER: Underwater shots. Australian fur seals, © Ken Hoppen.

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