



Australian Government  
Department of Agriculture,  
Fisheries and Forestry  
Bureau of Rural Sciences

# SOUTH EAST TRAWL FISHERY: SEAL BYCATCH

➞ *Guidelines for reporting  
and data collection*



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## 1. Overview



### REASON FOR THIS BOOKLET

Currently, there is little information on seal–fishery interactions in the wet boat sector of the South East Trawl Fishery (SETF), so it is difficult to assess the nature and extent of the issue, or to develop effective mitigation measures.

This booklet is part of a larger industry-based education and monitoring program that will encourage more accurate and regular reporting of seal–fisheries interactions in the SETF.

### WHAT IS IN THIS BOOKLET?

The first part of the booklet (sections 2–5) provides fishers with information on seal–fisheries interactions in the wet boat sector of the SETF. It provides a chart of species of seals found in Australian waters, and identifies those species that are likely to be encountered on the SET fishing grounds, i.e., the Australian and New Zealand fur seals. Fishers are provided with illustrations, photographs and descriptions to help them identify these species, to assist them with their reporting requirements.

The second part of the booklet (sections 6–7) provides information on seal biology and population dynamics of Australian and New Zealand fur seals. Seals are important high-level predators in the marine ecosystem, but little is known about the current impacts of fishing on seal populations and activities. More information is needed about the nature and extent of seal interactions to manage the fishery in an ecologically sustainable way. By increasing fishers' knowledge of seals (notably their importance to the marine ecosystems and conservation status), attitudes to seals are expected to change. A key aspect of this change is that fishers are more likely to report interactions and mortalities in the Australian Fisheries Management Authority (AFMA) logbooks.

The third part of the booklet (section 8) focuses on protection and conservation of seals. All seals are protected by law. You are required by law to report if you capture, kill or injure a seal. You will not be liable for prosecution if your interaction with a seal was accidental and you were operating in accordance with the prescribed fishery management plan.

The final part of the booklet (sections 9–11) concentrates on monitoring and data collection. Fishers must report all seal interactions and mortalities in AFMA logbooks in order to: (i) assist in meeting the *Environment Protection and Biodiversity (EPBC) Act, 1999* and Bycatch Action Plan requirements, (ii) find out where most interactions are happening, and (iii) understand changes in space and time in seal bycatch rates. Furthermore, fishers are asked to collect biological material so that the species, sex and age of seals that interact with the fishery are better understood.

A flow chart is provided at the end of this booklet which explains, step-by-step, how to report an interaction with a seal, and how to collect biological material.

### BENEFITS OF REPORTING SEAL INTERACTIONS AND COLLECTING BIOLOGICAL MATERIAL

- Gain a better understanding of the nature and extent of seal interactions.
- Help industry develop effective measures to reduce the interactions.
- Improve community perceptions relating to this issue, by informing the public that fishers are addressing the problem of seal bycatch.
- Through increased reporting, and satisfactory validation of the industry-based monitoring program, industry will better meet the data collection and reporting standards for seal–fisheries interactions required under the *EPBC Act, 1999* and the Bycatch Action Plan.





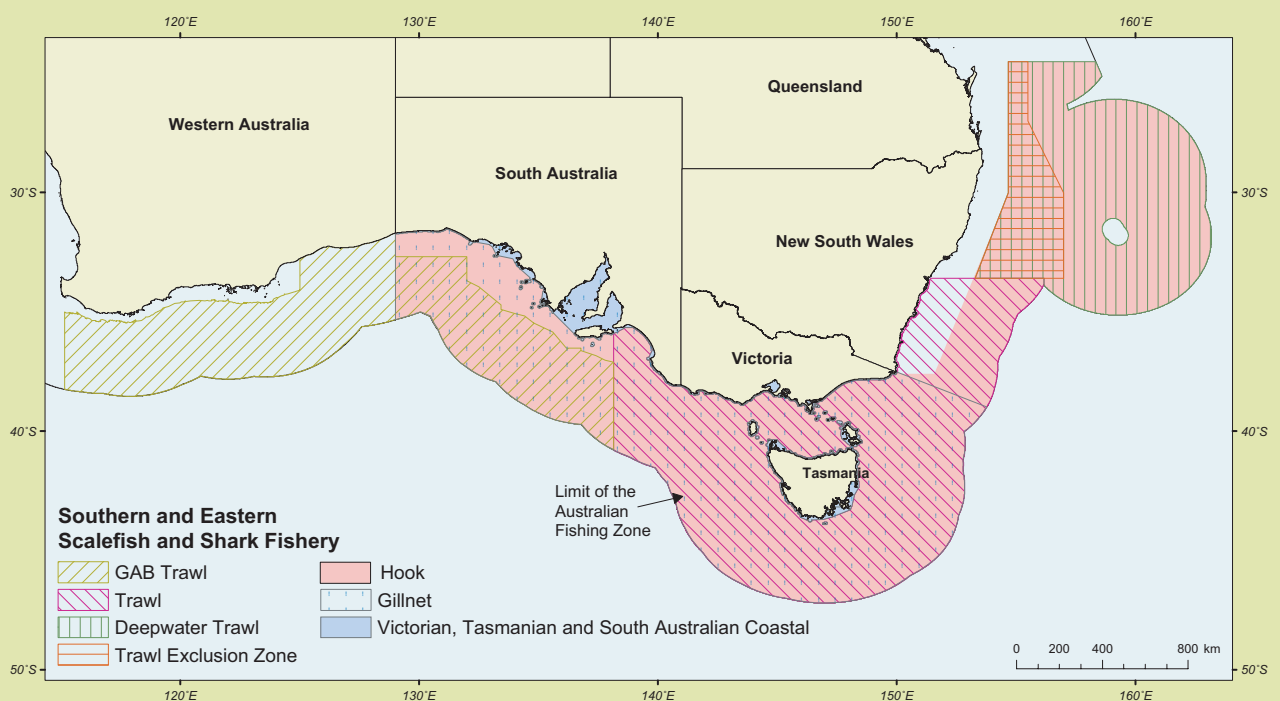
## 2. South East Trawl Fishery

The South East Trawl Fishery (SETF) sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF) is managed by quotas on 24 species/species groups, with numerous commercial non-quota species also taken (Figure 1). The trawl fleet uses both otter trawl and Danish seine. Up to 118 boats may fish in the SETF, while up to 46 boats may fish in the Commonwealth Victorian Inshore

Trawl. Most of the trawl vessels are wet boats (fishing vessels that store fresh fish on ice or brine) that use demersal trawls, but a few factory vessels operate in the winter grenadier fishery off western Tasmania using midwater trawls. Fishing effort is around 100 000 hours of trawling per annum. In the financial year 2003–04, the catch for this sector of the SESSF was 27 559 t, valued at over A\$54 million.

**FIGURE 1** Management areas of the various sectors in the Southern and Eastern Scalefish and Shark Fishery

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### 3. Seal–fisheries interactions

The fishing areas of trawl vessels in the SETF and the foraging areas of Australian and New Zealand fur seals overlap. As some of the prey species eaten by fur seals are also of commercial importance, it is inevitable that there will be interactions.

Interactions can be operational (seals interact with fishing gear and boats, which may be detrimental to the seal, fishers or both) or ecological (indirect competition for common prey species). The operational interactions that affect fisheries include damage or loss of catch, damage to fishing gear, and disturbance of operations. Operational interactions that affect seals include incidental mortality or injury following entanglement, deliberate mortality such as shooting, and harassment.

Fur seals are highly intelligent animals. Some have learnt to associate trawl vessels with food and follow the trawlers, feeding on discarded offal and fish. Sometimes seals are drowned in nets (incidental bycatch) while scavenging from trawlers. Because seals are charismatic creatures, and are protected under legislation (by making it an offence to kill, injure, take, trade, keep or move these species), their fate arouses public concern. The incidental bycatch of seals by trawlers thus has negative political and socio-economic impacts upon this fishery.

Furthermore, incidental bycatch of seals has impacts on seal populations and the ecosystem balance which could be negative in the longer term. Our current understanding suggests that the role of higher-trophic-level predators (e.g., seals) is important in maintaining the ecosystem, as their removal will have unknown effects on the remaining flora and fauna.

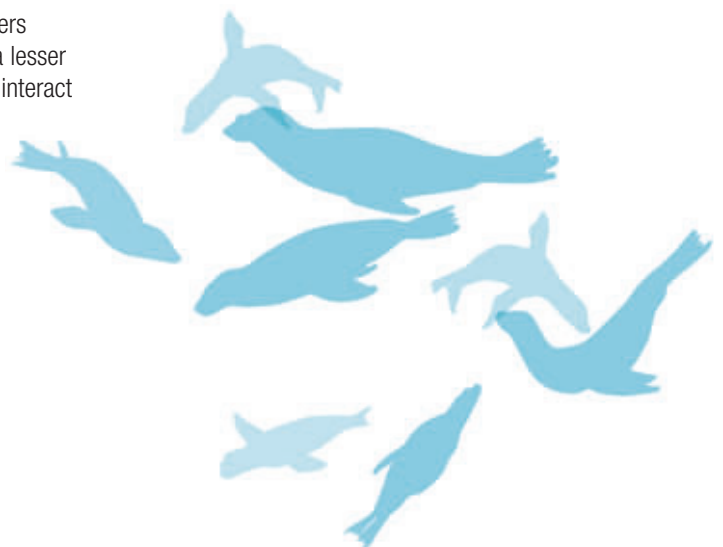
There is very little quantitative and independent information on the nature and extent of interactions for wet boats operating in the SETF:

- Knuckey *et al.* (2002) investigated seal interactions in the wet boat sector of the 2001 spawning blue grenadier fishery. Eight trips, incorporating 59 sea-days, 38 fishing days and 99 individual shots were monitored. A total of nine seals were captured, of which five were released alive and four were dead. All were Australian fur seals. The total seal capture rate was one seal per 12 shots and mortality rate was one seal per 33 shots.
- Knuckey *et al.* (2002) also examined Integrated Scientific Monitoring Program (ISMP) and Scientific Monitoring Program (SMP) data for the wet boat sector of the SETF from 1993–2000. Results suggested that fur seals were caught in shelf waters throughout all regions of the SETF during all months of the year ( $n = 121$  seals). Seal capture rates varied considerably, with an average of about 720 fur seals caught each year across the fishery (one seal in every 50 shots). Catch rates were slightly higher off western Tasmania and western Victoria. About one third of captured seals were released alive, but there is no information concerning the survival rate for seals released after capture in trawl gear.

The SETF was established in 1915 when fur seal populations were still depleted from over-harvesting during the late eighteenth and nineteenth centuries. As some fur seal colonies begin to recover, entanglement and mortalities are also likely to increase.

### 4. Seal species found in the Australian waters

Ten species of seal are found in Australian waters (Table 1). Of these, the Australian fur seal, and to a lesser extent the New Zealand fur seal, are most likely to interact with fishing operations in the SETF.



**TABLE 1** Seal species found in the Australian watersFamily **Otariidae** (eared seals)Family **Phocidae** (true seals)

<p><b>SPECIES</b> <b>Australian fur seal<sup>1</sup></b> <i>Arctocephalus pusillus doriferus</i></p> <p><b>BREEDING AREA</b> Continental Australia</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Likely to occur</p>		<p><b>SPECIES</b> <b>Southern elephant seal</b> <i>Mirounga leonina</i></p> <p><b>BREEDING AREA</b> Subantarctic islands</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Unlikely to occur</p>	
<p><b>SPECIES</b> <b>New Zealand fur seal</b> <i>Arctocephalus forsteri</i></p> <p><b>BREEDING AREA</b> Continental Australia</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Likely to occur</p>		<p><b>SPECIES</b> <b>Leopard seal</b> <i>Hydrurga leptonyx</i></p> <p><b>BREEDING AREA</b> Antarctic sea-ice</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Unlikely to occur</p>	
<p><b>SPECIES</b> <b>Australian sea lion<sup>2</sup></b> <i>Neophoca cinerea</i></p> <p><b>BREEDING AREA</b> Continental Australia</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Unlikely to occur</p>		<p><b>SPECIES</b> <b>Crab-eater seal</b> <i>Lobodon carcinophagus</i></p> <p><b>BREEDING AREA</b> Antarctic sea-ice</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Unlikely to occur</p>	
<p><b>SPECIES</b> <b>Subantarctic fur seal</b> <i>Arctocephalus tropicalis</i></p> <p><b>BREEDING AREA</b> Subantarctic islands</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Unlikely to occur</p>		<p><b>SPECIES</b> <b>Weddell seal</b> <i>Leptonychotes weddellii</i></p> <p><b>BREEDING AREA</b> Antarctic sea-ice</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Highly unlikely to occur</p>	
<p><b>SPECIES</b> <b>Antarctic fur seal</b> <i>Arctocephalus gazella</i></p> <p><b>BREEDING AREA</b> Subantarctic islands</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Highly unlikely to occur</p>		<p><b>SPECIES</b> <b>Ross seal</b> <i>Ommatophoca rossii</i></p> <p><b>BREEDING AREA</b> Antarctic sea-ice</p> <p><b>LIKELIHOOD OF SEAL-FISHERY INTERACTION</b> Highly unlikely to occur</p>	

<sup>1</sup> Endemic subspecies<sup>2</sup> Endemic species

Red: Seal-fisheries interactions are **likely to occur** (frequently seen in the SET fishing grounds).

Amber: Seal-fisheries interactions are **unlikely to occur** (frequent/occasional 'visitors' to the Australian mainland). Note: Australian sea lions may be encountered in the western areas of the fishery.

Green: Seal-fisheries interactions are **highly unlikely to occur** (not encountered in the SET fishing grounds).

## 5. Identification of Australian and New Zealand fur seals

Although fishers are required to report interactions with all species of seals, this section focuses primarily on those species most likely to be encountered in the SETF fishing grounds, i.e., the Australian fur seal, and to a lesser extent the New Zealand fur seal.

Australian and New Zealand fur seals are similar in appearance. Similarities include:

- **Fur:** dense underfur with long guard hairs (outer fur).
- **Body size:** males are considerably larger than females; older males have a greatly enlarged neck.
- **Mane:** older males have slightly longer and often lighter guard hair around the neck and chest (mane-like), which is absent in females.
- **Ear flaps:** long and prominent.
- **Snout:** relatively long and pointed.
- **Whiskers:** usually reaching to or past the ears; mostly on the sides of the muzzle.
- **Nose:** fleshy; small to medium-sized; nostrils facing ahead.

- **Teeth (dental formula):** incisors 3/2; canines 1/1; post-canines 6/5.
- **Front flippers:** incompletely furred; claws small or absent.
- **Hind flippers:** about one-fifth of standard body length; incompletely furred with thin growth of short hair on top. Digits all roughly equal in length; three claws on each hind flipper on the three central digits.
- **Tail:** short, free tail.
- **Penis and testes:** males have a penile opening about two-third of the distance from the anus to the belly button (umbilicus). The testes are often flush with the abdomen (not always pendulous).
- **Nipples:** Females have four concealed nipples on the abdomen, two either side of the belly button.

Key features to help fishers distinguish between Australian and New Zealand fur seals are summarised in **Table 2**. Although fur colour is often used as a key feature, it is **not** reliable because it changes with age, dryness and stage of moult, and may differ between individual animals.

**TABLE 2** Key distinguishing features of Australian and New Zealand fur seals

	AUSTRALIAN FUR SEAL		NEW ZEALAND FUR SEAL	
	Adult male	Adult female	Adult male	Adult female
<b>Head</b>	<ul style="list-style-type: none"> <li>very large and broad</li> <li>little or low brow</li> <li>snout rounded (dog-like)</li> </ul>	<ul style="list-style-type: none"> <li>smaller and narrower than the male</li> <li>no obvious brow</li> <li>snout rounded (dog-like)</li> </ul>	<ul style="list-style-type: none"> <li>large and broad</li> <li>brow distinct</li> <li>snout pointy (the enlarged area around the nostrils accentuates the pointy snout)</li> </ul>	<ul style="list-style-type: none"> <li>smaller and narrower than the male</li> <li>low brow</li> <li>snout pointy</li> </ul>
<b>Front flippers</b>	<ul style="list-style-type: none"> <li>paddle-shaped (rounded) with obvious thickening of the trailing edge before it joins the body</li> <li>large and thick</li> </ul>	<ul style="list-style-type: none"> <li>paddle-shaped (rounded) with obvious thickening of the trailing edge before it joins the body</li> <li>smaller and thinner than the male</li> </ul>	<ul style="list-style-type: none"> <li>oar-shaped (long with straight sides) with little or no thickening of the trailing edge before it joins the body</li> <li>large and thick</li> </ul>	<ul style="list-style-type: none"> <li>oar-shaped (long with straight sides) with little or no thickening of the trailing edge before it joins the body</li> <li>smaller and thinner than the male</li> </ul>
<b>Fur colour (dry)</b>	<ul style="list-style-type: none"> <li>light greyish-brown with a paler chest and darker brown belly</li> <li>mane lighter in older males</li> </ul>	<ul style="list-style-type: none"> <li>pale fawn to lighter greyish-brown with a pale chest and brown belly</li> </ul>	<ul style="list-style-type: none"> <li>uniform dark grey to brown with pale muzzle fur</li> </ul>	<ul style="list-style-type: none"> <li>brown to dark brown with greyish tones</li> <li>lighter brown throat and chest, with dark brown abdomen</li> </ul>
<b>Fur colour (wet)</b>	<ul style="list-style-type: none"> <li>generally grey with black flippers</li> </ul>	<ul style="list-style-type: none"> <li>generally grey with black flippers</li> </ul>	<ul style="list-style-type: none"> <li>generally darker grey with black flippers</li> <li>darker and more uniform than Australian fur seals</li> </ul>	<ul style="list-style-type: none"> <li>generally darker grey with black flippers</li> <li>darker and more uniform than Australian fur seals</li> </ul>
<b>Pups</b>	<ul style="list-style-type: none"> <li>born black with a variable grey ventrum (= underside)</li> </ul>		<ul style="list-style-type: none"> <li>born dark-brown with a lighter snout and belly</li> </ul>	
<b>Juveniles</b>	<ul style="list-style-type: none"> <li>much the same colour as the adult females, but often with lighter fur extending from the jaw below and behind the ears</li> </ul>		<ul style="list-style-type: none"> <li>a rich dark-brown with a pale white or cream moustache</li> </ul>	



## KEY DISTINGUISHING FEATURES OF ADULT MALES

It is difficult to differentiate between Australian and New Zealand fur seals from their appearance alone.

Here we focus on the general shape and size of adult males because:

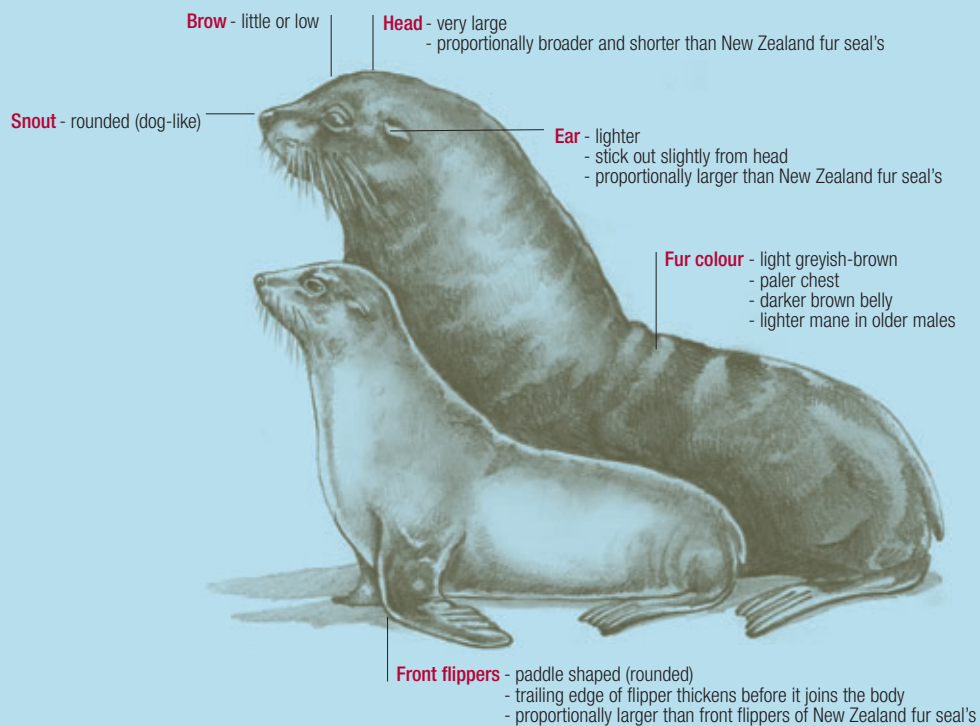
→ adult male fur seals are easier to identify.

→ in the past, more males than females have been caught on SET fishing grounds. Females tend to remain closer to breeding colonies in order to feed and care for their young.

Figure 2 depicts key distinguishing features of adult males.

**FIGURE 2** Key distinguishing features of male Australian and New Zealand fur seals. Adult females are drawn in front of the males to show that the males are much larger than females

### AUSTRALIAN FUR SEAL



### NEW ZEALAND FUR SEAL



## 6. Biological overview of Australian and New Zealand fur seals

### AUSTRALIAN FUR SEAL

	BIOLOGICAL PARAMETERS
Growth and age	<div><div>Birth weight; length</div><div>5–12 kg; 60–80 cm</div><div>Weaning age</div><div>10–12 months</div><div>Weight<sup>1</sup>:</div><div><div>Male</div><div>218–360 kg (average 279 kg)</div><div>Female</div><div>41–113 kg (average 78 kg)</div></div><div>Length<sup>1</sup>:</div><div><div>Male</div><div>201–227 cm (average 216 cm)</div><div>Female</div><div>136–171 cm (average 157 cm)</div></div><div>Longevity:</div><div><div>Male</div><div>at least 19 years</div><div>Female</div><div>at least 21 years</div></div></div>
Reproduction	<div><div>Age at sexual maturity:</div><div><div>Male</div><div>about 5 years (hold territories at 8–13 years)</div><div>Female</div><div>3–6 years</div></div><div>Active gestation</div><div>about 9 months (plus about 3 months delayed implantation, i.e., egg is fertilised but not immediately implanted)</div><div>Pupping interval</div><div>12 months</div><div>Pupping season</div><div>Late October–late December (median date between 26 November and 1 December)</div><div>Mating season</div><div>November–January</div></div>
Diet and foraging behaviour	<div><ul style="list-style-type: none"><li>• Principally benthic foragers (feed on the ocean floor).</li><li>• Opportunistic feeders taking a variety of prey, particularly fish, squid, cuttlefish and octopus.</li><li>• Mainly feed on fish in winter and squid, cuttlefish and octopus in summer. In Tasmanian waters, Gould's (Arrow) squid is most common.</li><li>• Fish species commonly taken include leatherjackets, redbait, barracouta, jack mackerel and red cod.</li><li>• Adults can dive to at least 164 m to feed.</li></ul></div>
Natural mortality	<div><ul style="list-style-type: none"><li>• At Seal Rocks (Victoria), at least 15 percent of pups die in their first two months.</li><li>• In Tasmanian colonies, about 15 percent of pups die in their first six weeks (early January).</li><li>• The natural causes of death in pups and/or adults include starvation; predation by sharks; disease; parasites; and impacts of storms/high tides on breeding areas.</li></ul></div>

<sup>1</sup> The average body size (weight and length) of seals caught in the SETF is likely to be smaller than the figures in the table above, because the table include very large territory-holding males that are not usually caught in the SETF.





## NEW ZEALAND FUR SEAL

	BIOLOGICAL PARAMETERS	
Growth and age	Birth weight; length	4–6 kg; 60–70 cm
	Weaning age	8–12 months
	Weight <sup>1</sup> :	Male 120–180 kg (average 126 kg) Female 35–50 kg (average 39 kg)
	Length <sup>1</sup> :	Male 150–250 cm Female 100–150 cm
	Longevity:	Male up to about 15 years Female up to about 22 years
Reproduction	Age at sexual maturity:	Male 4–5 years (hold territories at 9–12 years) Female 4–5 years
	Active gestation	about 9 months (plus about 3 months delayed implantation)
	Pupping interval	12 months
	Pupping season	Late November–early January (most births in mid-December)
	Mating season	mid-November–mid-January
Diet and foraging behaviour	<ul style="list-style-type: none"> <li>• Principally epipelagic foragers (feed at surface to depths generally not exceeding 200 m), but will forage benthically at times.</li> <li>• Opportunistic feeders, taking a variety of prey, particularly cephalopods (squid, e.g., Arrow; and octopus) and fish, especially barracouta.</li> <li>• Adults can dive to depths greater than 300 m to feed.</li> </ul>	
Natural mortality	<ul style="list-style-type: none"> <li>• Between 19 and 3 percent of pups die within five months.</li> <li>• No data for post-weaning survival.</li> <li>• The natural causes of death in pups and/or adults include starvation; predation by sharks; disease; parasites; and impacts of storms/high tides on breeding areas.</li> </ul>	

<sup>1</sup> The average body size (weight and length) of seals caught in the SETF is likely to be smaller than the figures in the table above, because the table include very large territory-holding males that are not usually caught in the SETF.



## 7. Distribution and abundance of Australian and New Zealand fur seals

### AUSTRALIAN FUR SEAL

There are three breeding colonies of Australian fur seals on islands off Victoria; two on the islands of the Victorian Bass Strait, and five on the islands of the Tasmanian Bass Strait (Figure 3).

The largest colonies are at Lady Julia Percy Island and Seal Rocks in Victoria. Haul-out sites extend from southern Tasmania to southern New South Wales (Montague Island, and Seal Rocks near Port Stephens), and Kangaroo Island in South Australia. Seals forage throughout their range. For example, seals born on Victorian islands forage in waters around Victoria, Tasmania, South Australia and New South Wales.

From the 2002 pupping season, it was estimated that about 20 000 pups are born each year. The total population of Australian fur seals is estimated to be 92 000.

The population of Australian fur seals breeding in Tasmanian waters, while variable between years, has not shown any substantial increase. Certainly, there were more breeding locations prior to sealing.

In Victoria, where 80 percent of pups are born, the most recent estimate is that almost twice as many pups were born in 2002, compared with in 1986. This increase in numbers is likely to be due to the gradual recovery from direct exploitation; a response to legal protection given to the species; and natural long-term population fluctuations. Overall, it appears that the total Australian fur seal population has increased and it may continue to do so if more territory is occupied at the main Victorian breeding sites.

Despite the recent increases, the population in Australian waters is probably still smaller than it was historically (pre-sealing), and may be only half the original size.

### NEW ZEALAND FUR SEAL

New Zealand fur seals breed in New Zealand and southern Australia, on the coasts of Western Australia, South Australia, Victoria and Tasmania (Figure 3). Most of the population lives between the southern tip of Eyre Peninsula and Kangaroo Island.

On Kangaroo Island (Cape Gantheaume, Nautilus Rock, Nautilus North and Libke Cave), New Zealand fur seals have been increasing in number since 1989. In 2001, pup numbers declined markedly, but by January 2002 numbers had increased to levels slightly higher than previously recorded.

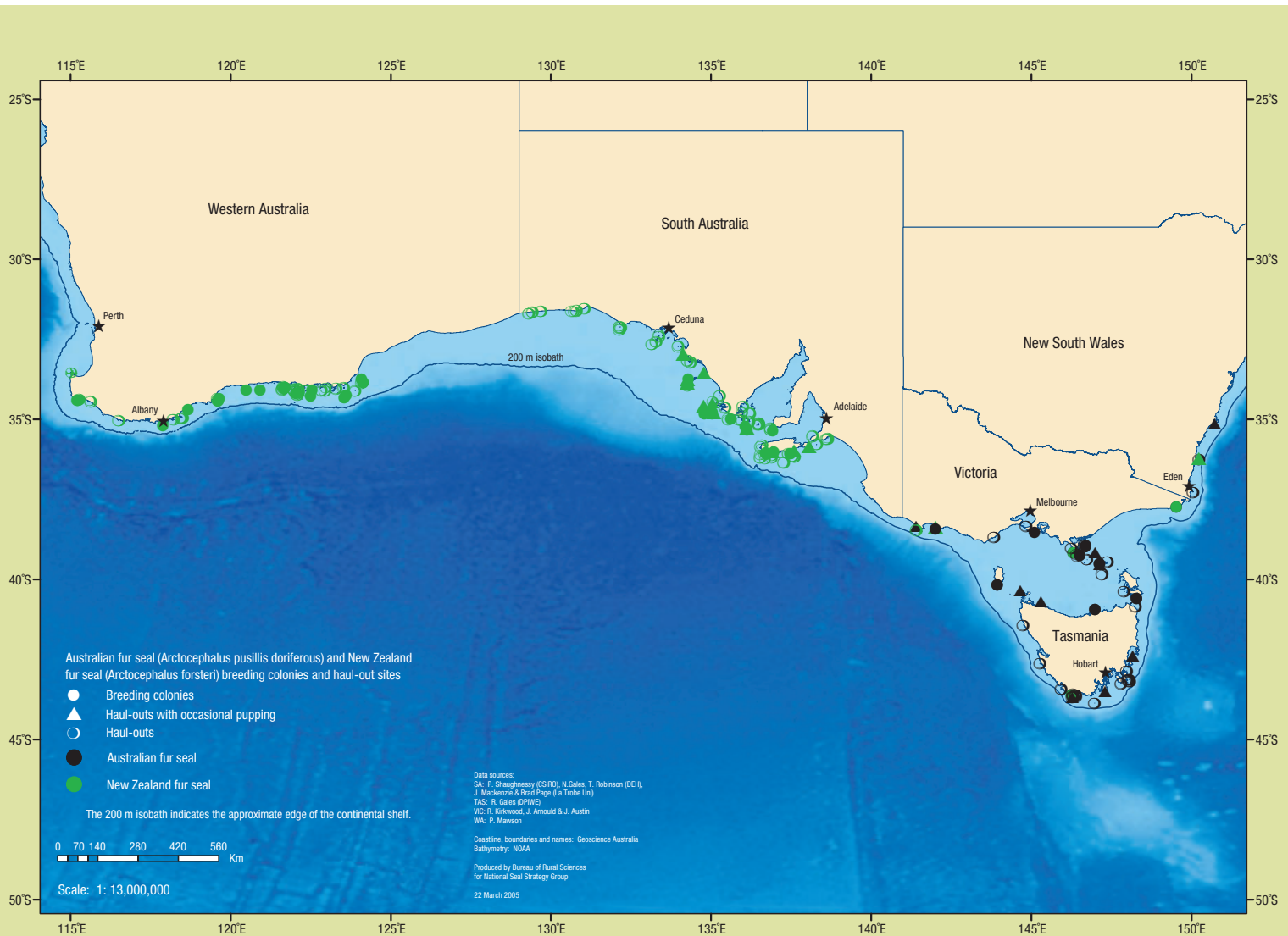
New Zealand fur seal populations in Western Australia have also been increasing from an estimated 7 100 in the 1989/90 season to about 15 100 in the 1998/99 season. Recently, New Zealand fur seals have re-established breeding populations at several islands in Bass Strait.

Despite the recent increases, the population in Australian waters is probably still smaller than it was historically (pre-sealing).



**FIGURE 3** *Distribution of breeding and haul-out sites of Australian and New Zealand fur seals within Australia, excluding external territories*

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- Definitions:**
- (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.





## 8. Australian Government and State legislation relevant to seals

In Commonwealth areas, the Australian Government Department of the Environment and Heritage has direct responsibility for the protection and conservation of seals. The Department of Agriculture, Forestry and Fisheries and Australian Fisheries Management Authority are involved in managing the impact of fisheries on seals under the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999* and the *Fisheries Management Act, 1991*.

All seals occurring within Commonwealth areas are protected under the *EPBC Act, 1999*. The Act recognises four categories of protected species: (1) *cetaceans*, (2) *listed threatened species*, (3) *listed migratory species* and (4) *listed marine species* (s 248). All seals are *listed marine species*—they are protected to help ensure their long-term survival. Southern elephant seals, subantarctic fur seals and Australian sea lions are also listed threatened species.

**Under the *EPBC Act* it is an offence to kill, injure, take, trade, keep or move a seal in a Commonwealth area unless the action is covered by a permit issued by the Minister for the Environment and Heritage. It is also an offence not to report any interactions with listed species.**

**The Act specifies that certain actions are not offences.**

**These include actions** authorised by a permit (taken in accordance with a wildlife conservation plan made under the Act, covered by an approval in operation under Part 9 of the Act) or **undertaken in accordance with an accredited management plan or regime (e.g., in accordance with the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003*)**. In addition, specified actions such as humanely killing an animal to relieve or prevent suffering, or to prevent a risk to human health or serious threat to human life are not offences. However, interaction occurring through non-adherence to an accredited management regime is an offence e.g., deliberate acts of malice such as shooting, clubbing or gaffing a seal.

In addition to Commonwealth legislation, some seal species are also afforded protection under State legislation (Table 3). State conservation agencies are responsible for seals on land, and in waters up to 3 nm off-shore, whereas the Commonwealth is responsible for seals outside State coastal waters and within the Australian Economic Exclusion Zone.

**TABLE 3** Australian Government and State legislation relevant to seals

JURISDICTION	AUTHORITY RESPONSIBLE FOR THE CONSERVATION OF SEALS	ACT	LISTING/CATEGORY
Australian Government	Department of the Environment and Heritage	<i>Environment Protection and Biodiversity Conservation Act, 1999</i>	<b>Vulnerable</b> Australian sea lion, Subantarctic fur seal, Southern elephant seal <b>Listed Marine Species</b> All seals
New South Wales	NSW Department of Environment and Conservation	<i>Threatened Species Protection Act, 1995; National Parks and Wildlife Act, 1974; Threatened species Conservation Act, 1995; Marine Parks Act, 1997 (NSW); Protection of Environment Operations Act, 1997</i>	<b>Vulnerable</b> Australian fur seal, New Zealand fur seal
Victoria	Vic. Department of Sustainability and Environment	<i>Wildlife Act, 1975; National Parks Act, 1975; Flora and Fauna Guarantee Act, 1988; The Fisheries Act, 1998</i>	<b>Protected</b> All seals
South Australia	SA Department for Environment and Heritage	<i>National Parks and Wildlife Act, 1972<sup>1</sup>; Fisheries Act, 1982</i>	<b>Rare</b> Australian fur seal, Australian sea lion, Southern elephant seal, Leopard seal <b>Protected</b> All seals
Western Australia	WA Department of Conservation and Land Management	<i>Wildlife Conservation (Specially Protected Fauna) Notice 2003 (WA); Wildlife Conservation Act, 1950; Policy formulation under State Fisheries Management Act, Wildlife Conservation (Close Season for Marine Mammals) Notice 1998; Fish Resources Management Act, 1995; Conservation and Land Management Act, 1984</i>	<b>Specially Protected</b> Australian sea lion, New Zealand fur seal <b>Protected</b> All seals
Tasmania and Macquarie Island	Tas. Department of Primary Industries, Water and the Environment	<i>Threatened Species Protection Act, 1995; Nature Conservation Act, 2002; National Parks and Reserve Management Act, 2002; Living Marine Resources Management Act, 1995</i>	<b>Rare</b> New Zealand fur seal <b>Endangered</b> Southern elephant seal, Subantarctic fur seal <b>Protected</b> All seals

<sup>1</sup> The Australian sea lion may be assessed under this Act for listing as vulnerable in line with the recent *EPBC Act, 1999* listing and the Subantarctic fur seal has been proposed endangered.

## 9. Monitoring and data collection

This booklet is part of a larger industry-based education and monitoring program. The larger program aims to:

- provide fishers with information on the biology and conservation of seals to increase fishers' knowledge about the role of seals in the ecosystem, and to encourage increased reporting of seal–fishery interactions.
- ensure that the industry is familiar with and applies its Code of Conduct, especially in relation to reducing incidental seal bycatch and seal mortality.
- establish a robust industry-based monitoring program that provides verifiable information on where and when seal–fishery interactions occur in the SET.
- develop and trial options (e.g., video surveillance) to validate the data collection and reporting system to quantify the extent of seal interactions, and report on the potential uptake by fishers of each option and the extent of effectiveness of each option in meeting the relevant strategic assessment requirements of the *EPBC Act, 1999*.

### EDUCATION PROGRAM

Apart from this booklet, the educational program will comprise:

- a revised *Industry Code of Conduct for Responsible Fishing* which will include information on reducing interactions with marine mammals.
- an educational video about seals and the industry-based monitoring program.

Educational material will be presented at workshops where fishers will be able to discuss seal biology, reporting requirements and data collection with seal experts, researchers and managers. By increasing fishers' knowledge of seals, and the ramifications of interactions with them, attitudes to seals are expected to change, and fishers are more likely to report interactions and mortalities in AFMA logbooks. Furthermore, the workshops will ensure that industry is familiar with its Code of Conduct in relation to reducing incidental seal bycatch and seal mortality.

The workshops will be followed up by regular port visits from the project liaison officer, who has a strong working knowledge of the wet boat sector of the SETF.

### MONITORING AND DATA COLLECTION

The project liaison officer and the network of port leaders will encourage fishers to monitor interactions with seals (i.e., report interactions and mortalities in AFMA logbooks), and to collect specific information and biological samples from seals drowned in nets.

- Key industry personnel from each SETF port will be selected as port leaders to promote involvement in this project through a 'lead-by-example' approach. Port leaders will agree to fully adopt the *Industry Code of Conduct for Responsible Fishing* in their fishing operations and be fully compliant with the *EPBC Act* reporting procedures.
- The data on incidental seal bycatch recorded by the port leaders will be compared with independent estimates of seal capture rates recorded by the ISMP, and as a measure of compliance of other industry members.
- AFMA logbooks will be checked to count the number of fishers reporting seal interactions.
- Port leaders will initiate a data-collection program that will encourage fishers to measure standard body lengths and collect an ear from seals that are drowned in nets. This information will be used to determine species, sex and age composition of the seal bycatch.



## 10. Reporting interactions: why, how and when

### WHY ARE FISHERS REQUIRED TO REPORT INTERACTIONS WITH SEALS?

There are a number of reasons why it is important for SET fishers to report interactions with seals:

- To collect information on and assess the level of seal interactions with fisheries.
- To assist in the management of the bycatch of the fishery, especially in the development of management and mitigation measures to reduce interaction levels.
- To feed into the Ecological Risk Assessments that are being conducted for all fisheries.
- To respond to actions outlined in the Bycatch Action Plan.
- Legal requirements (e.g., *EPBC Act, 1999*).

Under Parts 10 and 13 of the *EPBC Act, 1999*, commercial fishers are required to operate in a manner that reduces the risk of seal bycatch and mortality, including to take all reasonable steps to avoid interactions. The *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003* was accredited under the *EPBC Act, 1999* in December 2003. It and other recent management arrangements state that: **'any operator that interacts with a protected species as listed in Part 13 of the EPBC Act, 1999, and is acting in accordance with the SESSF management plan, will not commit an offence if their operations are consistent with the Plan ... Failure to report an interaction with a protected species is an offence under the EPBC Act, 1999'** (*SESSF 2004, A guide to 2005 Management Arrangements*, pp 58–59).

The SESSF Management Plan imposes obligations on concession holders to take all reasonable steps to avoid interactions with listed threatened species (see **Table 3**), listed migratory species, and listed marine species (e.g., all seals and sea lions) (s 47), and sets out provisions to facilitate continued improvement of management measures.

Concession holders must permit the Australian Fisheries Management Authority' (AFMA) nominated observers to travel on vessels operating in the fishery and give AFMA reasonable access to biological, economic or technical information, or biological samples available to the holder (s 46). AFMA must also develop and implement a Bycatch Action Plan, or Bycatch Action Plans, for the fishery (s 8).

In accrediting the *SESSF Fishery Management Plan 2003*, the Minister for Environment and Heritage recommend AFMA further improve the ecologically sustainable management of the Fishery relating to seals. AFMA is currently working to implement the recommendations. AFMA, in consultation with industry, the Department of the Environment and Heritage, researchers and other stakeholders, will further assess and reduce the extent of interactions of seals across all sectors of the SESSF. Specifically, AFMA will:

- establish robust data-collection and reporting systems to quantify the extent of interactions.
- trial and implement, as appropriate, mitigation or avoidance measures, including further trials of bycatch-exclusion devices and spatial or temporal closures.
- extend across the trawl sectors management measures assessed as effective to help reduce interactions with seals and sea lions.

### HOW DO FISHERS REPORT INTERACTIONS WITH SEALS?

If you interact with a seal, you must do the following:

**STEP ONE** At the bottom of the Catch and Effort–EFT01 Daily Fishing Log, circle 'Yes' that you had an interaction with a seal.

**STEP TWO** Complete the Listed Marine and Threatened Species Form (**Figure 4**) printed in the back of the logbook. These forms (= logsheets) are linked by a logsheet number, page number and date.

In the comments section of the Listed Marine and Threatened Species Form (**Figure 4**), record where possible:

- a) species of seal;
- b) sex of seal;
- c) life stage of seal—pup, juvenile or adult;
- d) where in the gear the seal was entangled (e.g., codend);
- e) how the seal was released (e.g., if the seal jumped overboard with no obvious injury; had to be cut from the net; was injured);
- f) any other information that is of interest or is unusual, e.g., changes in seal abundance (a number of seals sighted where there had been none sighted for several weeks) or notes on seal behaviour around the boat (a number of seals swimming around the boat but no interaction occurred).

The following diagram (**Figure 5**) depicts how to differentiate males and females based on the appearance of the genitals.

### WHEN ARE FISHERS REQUIRED TO REPORT INTERACTIONS WITH SEALS?

The Catch and Effort–EFT01 Daily Fishing Log must be completed for every day that the fishing concession is in force, regardless of whether or not fishing takes place on that day. All logbook information must be recorded on a shot by shot and daily basis and details for the last day of the trip must be recorded before the boat docks at the end of each trip.



It is important to note that any operator that interacts with a seal, and is acting in accordance with the SESSF management plan, will not commit an offence if their operations are consistent with the Plan. However, failure to report an interaction in Commonwealth waters with a protected species within seven days of the incident is an offence under the *EPBC Act, 1999*. It is also an offence under the *Fisheries Management Act, 1999* to not fully complete the logbook which applies to the protected species reporting form.

AFMA is currently working with the Department of the Environment and Heritage (DEH) to streamline the reporting of protected species interactions. This streamlining, once in place, will have AFMA provide summary reports of interactions to DEH based on information fishers record in the AFMA logbooks. Prior to any reporting to DEH, AFMA will be informing all concession holders of this arrangement and asking for their support for this initiative. Once in place, this arrangement will reduce the reporting burden on fishers for protected species interactions.

FIGURE 4 Example of a Listed Marine and Threatened Species Form

Australian Fisheries Management Authority  
Box 7051  
Canberra Business Centre ACT 2610

**LISTED MARINE AND THREATENED SPECIES FORM**  
Please use one form per day

Boat Name: Top Shelf  
Distinguishing Symbol: LFB123

Date of Interaction: 11 / 12 / 05  
Corresponding logsheet no.: 12  
Observer on board (tick box): Yes ☐ No ☒

Log No.: **119**

Species Name: Australian fur seal  
No. of Sea Horses: 0500hrs  
Time at which Interaction occurred (24hr): 3, 7, 0, 6  
Latitude/Longitude of Interaction: 1, 5 0 1 2, 7  
dd mm | ddd mm

Caught During Fishing Operation (tick one box only):  
Net ☒ Gill ☐ Other ☐

Band or Tag Number: Nil

Life Status (tick one box only):  
Alive ☐ Dead ☒ Injured ☐

Comments:  
Is there anything else that you believe to be important information, for example: Female, male, adult, juvenile?  
Where was the animal tangled (flippers, mouth, wing, etc.)?  
Where in the gear was the animal tangled (codend, wingend, warps, BRDs, etc.)?  
How was the animal released (lowered by hand, lowered with a net into the water, cut out net, etc.)?  
x1 Adult male - scrotum and opening of penis evident  
- large body size  
- thick neck with mane  
- entrapped in codend (dead)

I certify the information, which I have provided on this form to be a complete and accurate record.

Concession Holder/Authorised Person Signature and Date: [Signature] 11 / 12 / 05  
Concession Holder/Authorised Person Printed Name: JIMMY JOHNS

WHITE - Original - Send to AFMA  
Please provide an estimate of the time taken to complete this form 4 min.

Not applicable to seals

Page No. of the Catch and Effort-EFT01 Daily Fishing Log

FIGURE 5 Appearance of male and female genital openings

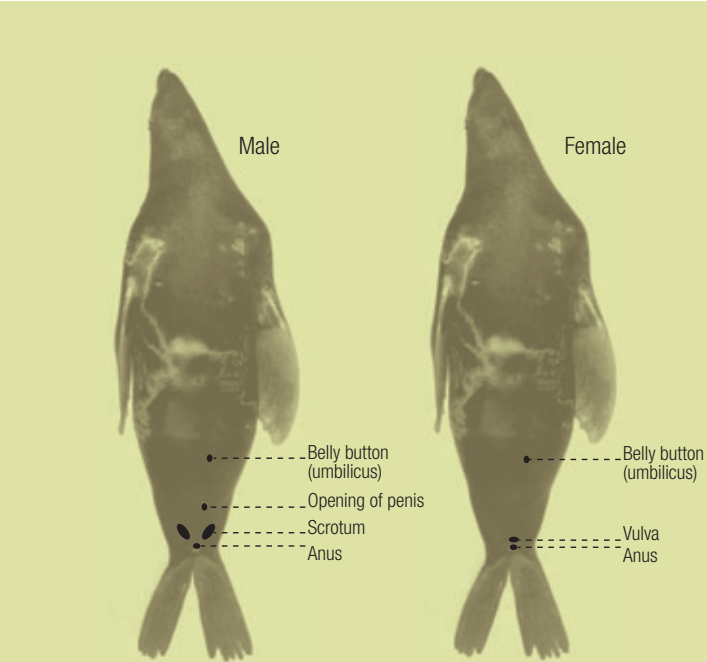


FIGURE 6 How to measure the standard body length of a seal



## 11. Collection of biological data and specimens

Fishers who are interested in improving our understanding of seal interactions are asked to collect biological material so that further information on the seal can be obtained.

- A port liaison officer will provide you with a collection kit that will enable you to collect biological material (ears) and measure standard body length from seals incidentally drowned in trawl nets.
- The DNA of the ears will be analysed to determine: (i) species and (ii) sex.
- Standard body length will be used to estimate age or age group.
- For each seal incidentally drowned, relevant information will be extracted from the AFMA logbook (e.g., time of day, water depth, catch). Note: Biological samples will be linked to the logbook data by date and shot number (refer to step four below).



**NOTE:** Interactions with seals **must be reported**, whether the seal is injured or not. If we are to show any change in interactions over a number of years, we **must have** a base line of what currently happens.

If you have a dead seal on board, you should:

### STEP ONE REMOVE ONE EAR

Cut off the ear with a clean knife as close to the ear base as possible.

### STEP TWO STORE THE EAR

Place the ear in one of the vials provided; they contain 90 percent alcohol. Store the container upright at room temperature and ensure that the cap is on tight. Ear samples can be stored in alcohol indefinitely at room temperature.

### STEP THREE MEASURE STANDARD BODY LENGTH

Two people are required to measure a seal. Roll the seal on to its back. Using the tape measure (300 cm) provided, measure the straight-line distance from the tip of the snout to the tip of the tail (Figure 6). Lift the tape measure clear of the curve of the body. Take care not to measure the contour of the body or the hind flipper.

### STEP FOUR RECORD THE INFORMATION FOR EACH DEAD SEAL ON THE LABEL PROVIDED

- Date (e.g., 3 May 2005)
- Shot number (for the day)
- Shot finish location (e.g., 41° 47'S, 144° 33'E)
- Standard body length (e.g., 125 cm)

### STEP FIVE PLACE THE COMPLETED LABEL IN THE VIAL WITH THE EAR OF THAT SEAL

### STEP SIX NOTIFY THE PORT LIAISON OFFICER THAT YOU HAVE SAMPLES FOR COLLECTION

PORT

LIAISON OFFICER



## REFERENCES

Australian Fisheries Management Authority and the Bureau of Rural Sciences (2004). *Final Report of the Special SESSFEAG Meeting, Reducing Seal Interactions and Mortalities in the South East Trawl Fishery, 20–21 November 2003, Canberra, ACT*. Australian Fisheries Management Authority and the Bureau of Rural Sciences, Canberra, 16 January 2004. 126 p.

Goldsworthy, S.D., Pemberton, D. and Warneke, R.M. (1997). Field identification of Australian and New Zealand fur seals, *Arctocephalus* spp., based on external characteristics. In: *Marine Mammal Research in the Southern Hemisphere, volume one: Status, ecology and medicine* (Hindell, M. and Kemper, C. eds). Surrey Beatty & Sons: Chipping Norton. pp 63–71.

Knuckey, I.A., Eayrs, S. and Bosschietter, B. (2002). *Options for reducing incidental catch of seals on wet-boats in the SETF: a preliminary report*. Marine and Freshwater Resources Institute. Final report to the Australian Fisheries Management Authority (AFMA). ARF Project R01/0887. 59 p.

National Seal Strategy Group (2005). *National Assessment of Interactions between Humans and Seals: Fisheries, Aquaculture and Tourism*. A report prepared for the Marine and Coastal Committee of the Natural Resource Management Standing Committee (In prep.).

## SPONSORS





## 12. Gallery of images

The photographs below are presented to help fishers identify both species of seal

### AUSTRALIAN FUR SEAL



Adult female with pup (left) and adult male (right)



Adult male



Adult male

Adult male

### NEW ZEALAND FUR SEAL



Adult males



Adult female with pup (left) and adult male (right)





Adult female



Australian fur seals

Young Australian fur seals



Pup



Adult male

Pup



Pup in foreground. Females with pups in background

Subadult male (practically identical to an adult female)





## MONITORING SEAL INTERACTIONS IN THE SETF

## FLOW CHART ➡ Reporting and data collection procedures

**Part 1. Seal Identification**

Ten species of seal are found in Australian waters. Of these, the Australian fur seal, and to a lesser extent the New Zealand fur seal, are most likely to interact with fishing operations in the SETF.

If you accidentally capture a seal (dead or alive) it is considered an 'interaction' and you should identify the species if possible. If it is not an Australian or New Zealand fur seal (**Figure A**), then refer to the seal species list in the booklet and try to identify it. If you are unable to identify the species, it is better to report 'unknown species' rather than guess.

**Part 2. Listed Marine and Threatened Species Form**

Fishers must report all seal interactions and mortalities in AFMA logbooks in order to: (i) assist in meeting the *EPBC Act, 1999* requirements, (ii) find out where most interactions are happening, and (iii) understand changes in space and time in seal bycatch rates.

If you interact with a seal, you must do the following:

- ➔ **Step one:** At the bottom of the Catch and Effort—EFT01 Daily Fishing Log, circle 'Yes' that you have had an interaction with a seal.
- ➔ **Step two:** Complete the Listed Marine and Threatened Species Form printed in the back of the logbook. These forms (= logsheets) are linked by a logsheet number, page number and date.

In the comments section of the Listed Marine and Threatened Species Form, record where possible:

- a) species of seal;
- b) sex of seal (refer to booklet for more detail);
- c) life stage of seal—pup, juvenile or adult (refer to booklet for more detail);
- d) where in the gear the seal was entangled (e.g., codend);
- e) how the seal was released (e.g., if the seal jumped overboard with no obvious injuries; had to be cut from the net; was injured);
- f) any other information that is of interest or is unusual, e.g., changes in seal abundance (a number of seals sighted where there had been none sighted for several weeks) or notes on seal behaviour around the boat (a number of seals swimming around the boat but no interaction occurred).

The Catch and Effort—EFT01 Daily Fishing Log must be completed for every day that the fishing concession is in force, regardless of whether or not fishing takes place on that day. All logbook information must be recorded on a shot by shot and daily basis and details for the last day of the trip must be recorded before the boat docks at the end of each trip. It is important to note that any operator that interacts with a seal, and is acting in accordance with the SSSF management plan, will not commit an offence if their operations are consistent with the Plan. However, failure to report an interaction in Commonwealth waters with a protected species within seven days of the incident is an offence under the *EPBC Act, 1999*. It is also an offence under the *Fisheries Management Act, 1991* to not fully complete the logbook which applies to the protected species reporting form.

**Part 3. Data Collection (optional)**

Fishers that are interested in improving our understanding of seal interactions are asked to collect biological material so that further information on the seal can be obtained. They will be provided with a collection kit comprising: gloves, measuring tape, vials containing alcohol, labels and a pencil. Wear gloves at all times and wash your hands after handling carcasses.

If you have a dead seal on board, you should:

**STEP ONE  
REMOVE ONE EAR**

Cut off one ear with a clean knife as close to the ear base as possible.

**STEP TWO  
STORE THE EAR**

Place the ear in one of the vials provided; they contain 90 percent alcohol. Store the container upright at room temperature and ensure that the cap is on tight.

Ear samples can be stored in alcohol indefinitely at room temperature.

**STEP THREE  
MEASURE STANDARD BODY LENGTH**

Two people are needed to measure a seal. Roll the seal on to its back. Using the tape measure provided, measure the straight-line distance from the tip of the snout to the tip of the tail (refer to the booklet for details).

Lift the tape measure clear of the curve of the body. Take care not to measure the contour of the body or the hind flipper.

**STEP FOUR  
RECORD THE INFORMATION FOR EACH DEAD SEAL ON THE LABEL PROVIDED**

Record the following details on label provided:

- ➔ Date (e.g., 3 May 2005)
- ➔ Shot number (for the day)
- ➔ Shot finish location (e.g., 41° 47'S, 144° 33'E)
- ➔ Standard body length (e.g., 120 cm)

**STEP FIVE  
PLACE THE COMPLETED LABEL IN THE VIAL WITH THE EAR OF THAT SEAL****STEP SIX  
NOTIFY THE PORT LIAISON OFFICER THAT YOU HAVE SAMPLES FOR COLLECTION**

PORT

LIAISON OFFICER



**FIGURE A** Key distinguishing features of Australian and New Zealand fur seals

