

Conclusions and future directions

CONCLUSIONS

In this multi-disciplinary study, I have documented the general biology of the Cape fur seal, including various aspects of anatomy, age and growth, sexual dimorphism, reproduction, parasitology, diet and foraging, and population size. Such information is of fundamental importance when formulating a meaningful seal conservation and management policy for the Eastern Cape coast.

Secondly, by examining historical records, I was able to document changes in the distribution and abundance of the local seal population. It was evident that seals in this region were almost exterminated due to excessive exploitation during the 1800s to the mid 1900s. Seven of the eight original seal colonies were extirpated. By destroying seal herds through indiscriminate practices, and confining the population to Black Rocks, the population has been unable to build up its numbers sufficiently to stimulate colonisation on neighbouring islands. Limited space for breeding seals on Black Rocks, and the influence of storms restricts the number of pups that can be reared successfully. It is therefore unlikely that the Black Rocks population can increase quickly enough to flow onto Seal and Stag Island, without being depleted by storms.

Thirdly, I have identified immediate and potential threats to the local seal population. Immediate threats include deliberate shooting of seals; incidental catch in commercial fishing gear; and storms (gale force winds and high swells) during the pupping/mating season. Entanglement in man made debris was identified as a potential threat. Other potential threats, not examined in the present study, include disturbance, habitat degradation, and episodic mass mortalities.

Threats

Deliberate shooting of seals

Although Cape fur seals are protected under Section 3(b) of the Sea Birds and Seals Protection Act 46 (1973), at least 1 000 seals are shot in Eastern Cape waters annually. At sea, it is not always possible to achieve a clean head shot, therefore, many seals are shot in the stomach or back, and die a slow, painful death.

Incidental catch in commercial fishing gear

In Eastern Cape waters, the annual overall mortality rate of Cape fur seals drowned in nets and deliberately killed during commercial trawling operations was estimated to be 549 (0.142 per trawl). Drowned animals were predominantly males, ≥ 5 y. Although the local seal population remains viable, the long term effects of changing the population structure, by removing males ≥ 5 years, are unknown.

Entanglement

Entanglement of Cape fur seals in man made debris such as mono-filament line, trawl net fragments and rope, did not appear to impact significantly on the local seal population. Observations during the 1993 pupping season at Black Rocks indicated that the minimum estimated frequency of entanglement was c. 0.11–0.22%. However, as the fishing industry continues to expand, more synthetic material will accumulate, and the incidence of entanglement in this area will subsequently increase.

Furthermore, as tourism increases, problems associated with ocean and beach litter (plastic bags, fishing line, nets and other rubbish) become more widespread. Land litter from catchments and stormwater drains is a major source of ocean and beach litter.

Disturbance caused by human activity

Black Rocks seal colony is relatively remote from human activity, i.e. 8–9 km offshore. However, the Rondeklippe colony, which is situated on the mainland, is in a popular tourist area. As recreational boating activities and tourism increases, seals may alter their behaviour and habitat use to avoid contact with humans.

Furthermore, the Coega Development Corporation is planning to build an industrial zone and a harbour at Coega (near Port Elizabeth). This site is c. 63 km from Black Rocks and overlaps with the seals foraging range. It is likely that the development will have serious negative effects on Cape fur seals and other marine life in the area. For example, there is the risk of pollution from toxic waste generated by the industries; and disturbance from underwater sound caused by dredging, harbour construction and increased shipping activities.

Habitat degradation

Oil spills pose a potential threat to seals in Eastern Cape waters. Ingestion of toxic hydrocarbons; absorption of oil into the fur, skin and mucous membranes; and loss of habitat, can adversely affect individual seals. The potential of an oil spill from fuelling ships in the port, operational discharges from shipping, and shipping accidents will increase if controversial plans to construct an industrial zone and a harbour, by the Coega Development Corporation, are realised.

Episodic mass mortalities

Considering that the seal population in Eastern Cape waters is small, an outbreak of disease would be potentially disastrous. The following examples demonstrate the potential vulnerability of pinnipeds to disease epidemics: (i) in 1964, uncinariasis was identified as the primary cause of death in northern

fur seals (*Callorhinus ursinus*) at St Paul Island in the Pribilofs, Alaska (Keyes, 1965); (ii) in 1970, an outbreak of Leptospirosis in California sea lions (*Zalophus californianus*) along the California and Oregon coasts affected hundreds of adult males, and was thought to be associated with a high rate of abortion in females (Vedros *et al.*, 1971; Smith *et al.*, 1974); (iii) in 1979 to 1980, more than 400 harbour seals (*Phoca vitulina*), mostly juveniles, died in New England from acute pneumonia associated with the influenza A virus (Reeves *et al.*, 1992); (iv) 20% of California sea lions pups died at San Miquel Island following premature parturition caused by an outbreak of the San Miquel sea lion virus (a calicivirus) (Gilmartin, *et al.*, 1976); and (v) in 1988, an outbreak of Phocine distemper virus (a morbillivirus) in the North Sea severely reduced several populations of harbour seals (Osterhaus & Vedder, 1988); and also reduced the grey seal (*Halichoerus grypus*) population, where pup production fell by 20% (Reeves *et al.*, 1992).

FUTURE RESEARCH

Monitoring seal numbers

In order to conserve and manage Cape fur seals in Eastern Cape waters, research should concentrate on monitoring seal numbers.

Considering that a large number of seals are being shot and entrapped in commercial trawl nets, continuing monitoring of the local population is essential. Aerial photography should continue to be used to count the number of pups present during the peak pupping period (usually the third week in December). The number of pups should be multiplied by five to give an estimate of the total population. Counts should be conducted each year. However, it is important to note that it is difficult to take good quality aerial photographs of pups on Black Rocks (i.e., black pups against a dark background), and estimates using this method are negatively biased. The use of tag-recapture methods is not to be recommended at this small island colony. When tagging pups at this site there is considerable disturbance, e.g., pups can be trampled or washed out to sea. Occasional 'ground truthing' of aerial counts is recommended. This can be achieved with a maximum of two observers conducting counts, using binoculars, from several vantage points. Traversing the entire rookery during the breeding season is not recommended.

Minimising negative interactions between seals and fishermen

In order to prevent seals interfering with fishing operations, and becoming entrapped in commercial trawl nets, research is needed to develop affordable, efficient and humane methods of deterring seals from fishing gear or fishing areas. Considering that 1 or 2 seals can cause losses for fishermen, culling is unlikely to reduce the magnitude of losses appreciably. Seal deterrents need to be developed for

trawl nets, line fish vessels and squid jig vessels. Methods of deterring seals already tested include: (i) various types of explosive fire-crackers (e.g., Thunderflashes, Belugas, and Seal deterrent) (Anon, 1976; Shaughnessy *et al.*, 1981); (ii) electric pulses and air guns (Anon, 1977); (iii) recorded sounds of killer whales, crackers and sounds of shots fired into the water (Anon. 1975a; Anon1975b; Anon 1978; Shaughnessy *et al.*, 1981); and (iv) an electronic unit called a Seal Scram which emits random underwater sound pulses set at a certain frequency (Wickens *et al.*, 1992). Some of these methods are thought to frighten fish, and none have been consistently successful at deterring seals (Wickens *et al.*, 1992).

Discarding of whole/parts of fish encourages seals to follow vessels. Therefore, research into efficient utilisation of/or disposal of offal and by-catch should be addressed. For example, mincers have been used to mince by-catch before it is thrown overboard, making it inaccessible to the seals (Wickens, 1994).

Monitoring the population for signs of disease

Considering that the seal population in Eastern Cape waters is small, a monitoring program accessing the incidence of disease is recommended. This can be achieved by collecting and analysing serum and tissue from seals which have stranded, or drowned in commercial trawl nets.

MANAGEMENT

In order to conserve seals in Eastern Cape waters, a comprehensive seal conservation and management plan is required. This can be achieved through the formation of a government 'advisory body' comprised of seal and fish biologists; members of the commercial fishing industry; representatives of government and non-government conservation groups; representatives of animal welfare groups; a marine mammal veterinarian; representatives of the department of town and planning; and local ecotour operators. Immediate and potential threats to the local seal population should be discussed in detail, and the appropriate policies and actions formulated.

The following key points should be discussed when formulating a seal conservation and management plan for the region:

(i) Incidental catch in commercial fishing gear

In order to minimise the number of seals entrapped in commercial trawl nets, it is necessary to design and trial new seal deterrent methods which discourage seals from approaching trawl nets. Successful methods must then be promoted.

Secondly, the possibility of altering fishing methods needs to be discussed with trawl operators.

Considering that seals make comparatively few dives > 160 m, trawl nets should be: (i) deployed as quickly as possible; (ii) held at depths > 160 m; and (iii) retrieve as quickly as possible when being hauled to the surface.

Furthermore, each vessel should be supplied with suitable equipment to capture and remove seals from the ship's factory area. Currently, seals which enter the factory area are usually killed to prevent potential injury to crew.

(ii) Deliberate shooting of seals

Legislation should be introduced to prohibit firearms aboard commercial and recreational fishing vessels, thereby preventing large numbers of seals from being shot at sea and injured.

In order to discourage seals from damaging gear, taking fish from lines, and scattering fish schools, it is necessary to trial new methods of deterring seals from fishing areas. The use of effective deterrents in both the teleost line and squid jig fisheries must then be promoted.

(iii) Entanglement

In order to reduce the quantity of rubbish discarded directly into the ocean by commercial and recreational fishermen (particularly fishing line, rope, string, packing straps and net fragments), stricter enforcement of regulations on disposal of garbage from vessels is required.

In order to decrease the amount of land litter entering the ocean, education programs to change public littering practices are required. Improved waste management by local authorities is also needed.

Ongoing monitoring of the incidence of entanglement at Black Rocks during the breeding season should continue.

(iv) Disturbance caused by human activity

Marine ecotourism is a fast growing industry. It is therefore necessary to regulate tourist and recreational activities near seal colonies to minimise adverse impacts on resident seals. Currently, disturbance by visitors is a potential problem on the mainland, at Rondeklippe seal colony.

Access to the Black Rocks seal colony should be limited to minimise disturbance, especially during the pupping/mating season.

(v) Habitat degradation

As industrial development, shipping and recreational boating activities continue to increase in the area, the potential of an oil spill also increases. Therefore, it is necessary to formulate a detailed contingency plan to deal with an oil spill near the Black Rock seal colony. The plan must provide specific response guidelines.

Urban and industrial run-off are also significant sources of oil entering the marine environment. Improved management practices by local authorities are required to minimise this problem.

(vi) Episodic mass mortalities

Stranded Cape fur seals which have been injured and suffer various illnesses are often rehabilitated at the local Oceanaria, e.g., at Port Elizabeth, East London and Durban. The possibility of disease transfer after release must be considered. In order to minimise the risk of disease at Black Rocks seals colony, it is necessary to formulate strict guide lines concerning the release of stranded seals (or captive seals) back into the wild population.

(vii) Education

Education is one of the most effective tools of management. Through education, we can increase public awareness of Cape fur seals and their conservation needs; and promote activities to prevent population decline on the south/east coast.

Information on Cape fur seal conservation can be distributed within the general community through education programs in schools and universities; workshops in community centers; exhibits at Museums and art galleries; displays and educational program at local Oceanaria; community consultation; literature, and the media (e.g., television, radio, the internet, newspapers and magazines).

(viii) Marine protected area

Currently, the establishment of a marine protected area within Algoa Bay is under consideration. The proposed marine protected area extends from the mouth of the Sundays River to beyond Cape Padrone, and seawards to include the Bird Island group and the St Croix Island group, covering 56 500 ha. It will form part of the proposed 'Greater Addo National Park'. Strong community and government support is needed for this proposal to reach fruition. The establishment of a marine protected area around Black Rocks seal colony will provide safe access to breeding and haul-out sites; and conserve feeding ground close to the colony.

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*"Pinnipeds are conspicuous competitors with humans for food and space.
They are victims of our expanding and often insensitive use of the sea".*

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