



Australian sea lions and humans share a taste for some sea food species, such as rock lobsters. *INSET: This juvenile Australian sea lion was snapped by a 'pot-cam', diving into the rock lobster pot. New measures have been introduced recently in commercial and recreational fisheries, to prevent the accidental drowning of pup and juvenile sea lions in these pots.*

RICHARD CAMPBELL

## FEEDING HABITS PROVIDE CLUES TO SEA LION THREATS

Australian sea lions, *Neophoca cinerea*, were recently added to the Federal threatened species list because of concerns over the current population status (about 11 200) and the threat of continued population declines. But what is threatening the future of our only endemic sea lion species?

A recent threat analysis highlighted the potential impact of incidental mortality of sea lions in demersal (bottom) set gillnet operations. Consequently, the Western Australian Department of Fisheries, through the new Australian Centre for Applied Marine Mammal Science (ACAMMS), will investigate the overlap between demersal gillnet fisheries and the foraging range of Australian sea lions, to better understand and, if necessary, mitigate this threat.

Australian sea lions inhabit the continental shelf environments of the southern and south-western coasts of Australia, from The Pages near Kangaroo Island in South Australia, around to the Houtman Abrolhos Islands in Western Australia. They are predominantly benthic (sea floor) feeders, diving to the sea bottom looking for a wide variety of

food, including commercial species, such as rock lobsters and octopus, to cuttlefish and sting rays. They forage across the continental shelf for days at a time, covering over 200 km on a round trip. This brings them into contact with human activities, including commercial fisheries, where they may make an easy meal of fish caught in nets or lobsters caught in a pot. Occasionally, however, they become trapped in the fishing gear and drown. Just how often this occurs, and the consequence of these incidental mortalities, is not known.

Recently, commercial and recreational lobster fishers in Western Australia have, in some areas, been required to fit exclusion devices to rock lobster pots to stop small sea lions becoming trapped and drowning. This has been achieved through years of consultation and hard work by the commercial fishery and the Western Australian Department of Fisheries.

The Department now hopes to gain a better understanding of the interaction between sea lions and the demersal set gillnet fisheries, which target many species of shark and finfish for both domestic and international markets. Because sea lions spend so much of their time at sea actually on the sea floor, there is a good chance they will come into contact with this commercial fishery.

The new ACAMMS project will investigate the foraging behaviour and range of pup, juvenile and adult female sea lions in Western Australia, using the latest satellite tag and micro-processor technologies. This will involve capturing animals to deploy the tags and returning a few weeks later to recapture the animals and retrieve the data. From

this information we will build up a picture of the foraging range of these various sized sea lions and construct a relatively simple model that predicts the foraging range of the entire population.

Whilst foraging studies have been conducted on this species in some populations, there is a great deal of variation in their behaviour from location to location. So we aim to obtain accurate information from as many sites as possible.

Shark fishing boats have their own kind of onboard tag – a Vessel Monitoring System or VMS. This accurately tracks the fishing effort and is complemented by a new daily logbook system that provides detailed information about the catch.

Putting these resources together will allow us to derive a map showing where the overlap between fishing effort and sea lion foraging effort is occurring. Together with information on the status of sea lion populations in the various areas, we will identify where the greatest threat posed by incidental capture in the fishing gear exists.

This knowledge can be used to investigate different scenarios about how to mitigate the capture of sea lions in gillnet fisheries. For example, a refined system of temporal and/or spatial closures could be designed that will have minimal disturbance on fishing activities and catches.

Other benefits of this project include gaining essential knowledge about the foraging habitats for this species. A greater understanding of their biology will also help determine how all the different users in the marine environment fit together. This kind of information is the cornerstone of managing marine ecosystems and in implementing ecosystem-based fishery management, which aims to ensure a sustainable future for all marine species.

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*A juvenile Australian sea lion fitted with a satellite tracking instrument, time-depth recorder and VHF tag. Data from these instruments will help scientists understand more about the animals' foraging behaviour and range.*

DIMITRIOS CHRISTIANOPOLIS