

Antarctic pack-ice seals count

THE LIVING RESOURCES OF THE Antarctic region have been harvested for over two hundred years with seal, whale and fish populations being severely depleted by unsustainable practices. Sustainable harvesting of biological resources in the Antarctic region requires a precautionary approach and knowledge of the structure of the ecosystem. Seals and penguins are heavily dependent upon Antarctic krill—a species of prawn-like crustacean which has been subject to substantial fishing pressure over the last 25 years. The importance of Antarctic krill to life in the Southern Ocean near the Antarctic ice edge is reflected in a major Australian program whose objective is to understand the structure of this important ecosystem.

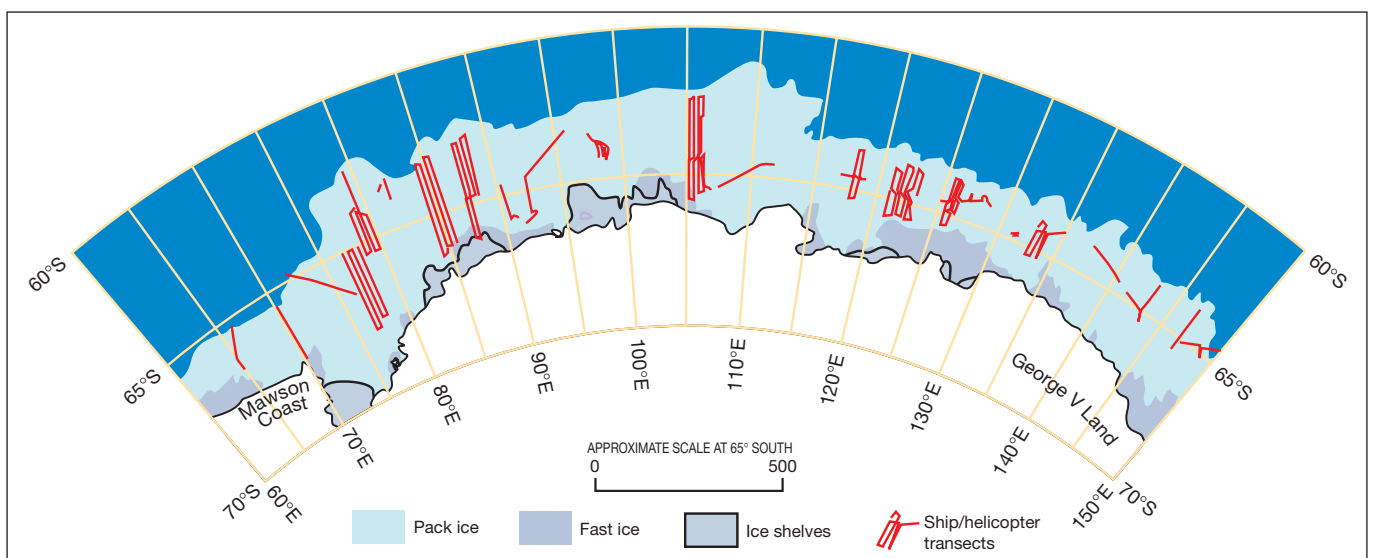
For some years the numbers of Adélie penguins breeding at Bechervaise Island near Mawson Station has been subject to annual census as part of Australia's contribution to an international ecosystem monitoring program coordinated by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), the body responsible for managing fishing in the Antarctic region. We are beginning to understand how their population fluctuates in response to environmental variability, particularly inter-annual changes in their food supply.



GRANT DIXON

The same cannot be said for the crabeater seal which inhabits the pack-ice encircling the Antarctic continent. Contrary to what is suggested by its name the crabeater seal does not eat crabs but Antarctic krill. As crabeaters are by far the most numerous of the pack-ice seals an accurate estimate of their numbers is crucial to our understanding of ecosystem dynamics.

During the 1960s the world population of crabeater seals was estimated at between 12 and 70 million but a more precise count was not possible on account of serious flaws in the methodology used. For our current studies on the dynamics of the Southern Ocean ecosystem an accurate estimation of the abundance of these important krill-harvesters is of the utmost importance. Crabeater seals may be the major overall consumer of krill even



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surpassing the depleted great whales, and knowledge of their population numbers is an essential part of the equation balancing krill stocks with all species—including humans—which harvest them.

The idea to mount an international, circumpolar survey of pack-ice seals was born almost a decade ago through discussions between CCAMLR and the Scientific Committee on Antarctic Research (SCAR). In 1994, six nations (Australia, USA, South Africa, UK, Norway and Germany) commenced a five-year program aimed at developing a standard methodology which all participating nations could utilise. The Australian Antarctic Division program took a leadership role in developing and coordinating this task, deemed as one of the most taxing and difficult wildlife surveys ever undertaken.

The survey, carried out between November 1999 and January 2000 involved two different but integrated activities. Counts of seals hauled out on the ice were made from the ice-breaking research vessel, the *Aurora Australis* and from long-range helicopters. Seals were captured for the attachment of electronic tags, which transmit data over a satellite link on their diving behaviour. These data allow a calculation to be made of the proportion of the population below the water—and therefore invisible—at any one time. When the two data streams are combined, an accurate assessment of seal density can be derived.

Each activity has its challenges. Unlike most wildlife surveys, in the harsh Antarctic environment it is not possible to plan exactly how each daily program will be run. The survey required several long passages running south from the ice-edge to the continent. The ice was often too thick for the *Aurora Australis* to penetrate and the weather was generally cloudy, making aerial survey difficult.

Attaching dive recorders to seals requires a team of people to catch and sedate a seal when it is hauled out



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on an ice floe. On a small floe, with 200 kg of surprised seal and in bitterly cold weather, this is a difficult and potentially dangerous operation. The seals are sedated using a dart gun loaded with anaesthetic and when sedated the small recording instrument is glued to the seal's back. It falls off when the seal moults, in late December or early January.

Our survey covered just short of a quarter of the entire circumpolar region, from 150°E near the French station of Dumont d'Urville, to 63°E near Mawson station. Our helicopters flew some 8000 km of survey tracks over 1 million square km of pack ice, and the ship chiselled a 2000 km route. A total of twenty-five seals have had dive recorders attached, including two that were attached to Ross seals—an extremely rare and little-known species. Dr Colin Southwell from the Australian Antarctic Division led the team of fourteen wildlife biologists, a veterinarian and an electronics engineer. Together with weather forecasters, helicopter and ship's crews, the team worked shifts round the clock during the twenty-four days' duration of the work.

The data from the survey will take many months to analyse, and even longer to integrate with those collected by other participating nations. But in the end we will know far more about the ability of the Southern Ocean to support sustainable managed fisheries—important information as a protein-hungry world plunges on into the 21st century. Australia can be justly proud of its leading role in this ambitious and timely international collaboration.

Colin Southwell, Antarctic Marine Living Resources Program, AAD

Helen Achurch and Kelvin Cope setting up aerial survey equipment in a Sikorsky helicopter. This equipment, designed by engineers at the Australian Antarctic Division, is a major advance in wildlife survey technology

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