South African research on Antarctic whales

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Thirty years ago, in the year in which the Antarctic Treaty came into force, the whaling industry succeeded in taking the largest number of whales ever killed worldwide in one year — about 66 000. By 1985-86, the last season of commercial whaling before a moratorium came into effect, this total had fallen to about 8 000. But if the commercial importance of whales has declined over this period, their ecological significance has not.

It has been estimated that, before modern commercial whaling started, the five major baleen whale species (blue, fin, sei humpback and minke) together consumed about 190 million tonnes of krill during their annual migrations to the Antarctic, and that the subsequent depletion of all the species (except minke whales) may have led to an increase in the availability of krill to other consumers of as much as 150 million tonnes a year (Laws, 1977). What happens to the whales now they are protected is therefore not just of interest to the potential consumers of whale products; it is information of vital importance to an understanding of the interactions between the krill-eating predators of the Antarctic ecosystem and the developing krill fishery.

In 1978-79 the International Whaling Commission (IWC) began a series of annual research cruises to different longitudinal sectors of the Antarctic, using vessels specially provided by the Japanese and Soviet governments. The principal objective was an assessment of the stocks of southern minke whales. These cruises are still continuing, and the Antarctic Ocean south of 60° S has now been circumnavigated twice. South African scientists have played a major role in instigating, planning, participating in and analysing the data from these cruises (e g Best & Ohsumi, 1980; Best & Butterworth, 1980; Butterworth, Best & Basson, 1982; Basson & Butterworth, 1984; Butterworth, Best & Hembree, 1984; Butterworth & Borchers, 1988; Borchers & Haw, 1990a, b). The data base developed has provided estimates of current abundance not only for the southern minke whale (ca 750 000), but also for other large whale species such as blue, fin and humpback whales. This is the first comprehensive and independent assessment of the state of these stocks since special investigations by the IWC Scientific Committee some 30 years ago.

Since the introduction of the moratorium, a key IWC initiative has been the development of a Revised Management Procedure (RMP) which would allow the resumption of whaling on a scientifically sound basis. The sightings surveys discussed above provide the essential data required for input to such a procedure. In an exercise which has proved to be the most thorough ever carried out for any marine fishery, South African scientists have made a major contribution to the computer simulation approach used to address this issue (e g Punt & Butterworth, 1989).

Development of the RMP has also required information about the range of possible sustainable yield rates for whale stocks (i e the proportion of the population that can be harvested on a continuing basis). One source of such information is the recovery rate of previously depleted stocks. In 1969 South African scientists began aerial surveys of the population of southern right whales that migrated to South African waters from the sub-Antarctic. This species has been protected the longest (since 1940) and depleted to the greatest extent (about 0,1% of its original size) of all southern baleen whales. Fixed-wing surveys from 1969 to 1987 have shown that this population is increasing at an exponential rate of 7% a year (Best, 1990a). Given the observed calving rate (once every three years — Best, 1990b), and likely age at first reproduction, this rate of increase must be considered close to the maximum possible, and as such has implications for an understanding of baleen whale population dynamics in general (Butterworth & Best, 1990).

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