

## Whale observations from ANARE ships

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### INTRODUCTION

Australia's interest and involvement in Antarctic whale research can be traced back to the first Australian Antarctic explorers. Douglas Mawson emphasised the need for scientific exploration as a response to the growth of the whaling industry and the territorial ambitions it aroused as whalers increased profits by applying new technology. Mawson viewed the whale observation data he collected as a quantitative indicator of the region's "richness in economically valuable products" (Price 1962). The log books of the 1929-31 British Australian New Zealand Antarctic Research Expeditions (BANZARE) voyages recorded frequent sightings of blue whales and fin whales suggesting plentiful populations and thus encouraging the spread of pelagic whaling in the Southern Ocean.

Over one million whales have been taken in Antarctic waters since the beginning of the twentieth century resulting in drastic reductions in the population sizes of the larger whale species. Assessment of whale populations has been difficult, with the majority of data being collected by commercial whaling fleets. Whaling vessels, however, usually concentrate their efforts in regions where previous experience indicates that whales will be abundant. This results in calculated densities which are significantly higher than the real mean (Gaskin 1982). Commercial bias and the need for information on protected or unexploited species prompted the Australian National Antarctic Research Expeditions (ANARE) to begin a regular whale survey. Since 1948 ANARE ships have been voyaging to the subantarctic islands and Antarctic continent each summer's shipping season providing an opportunity for the independent monitoring of whale population densities. The lack of success in this and the reasons for it are a major theme of this paper.

### PREVIOUS ANARE STUDIES

ANARE voyages to the Antarctic are scheduled for the summer months. In most years they begin in October and finish in March. The ANARE ships follow similar transects each year between the Australian Antarctic stations, subantarctic islands and Tasmania between 60° to 160° east and 40° to 69° south.

From 1948 through 1960 no specific whale logs were kept but sightings made during bird observations and incidental sightings made by crew members or ANARE expeditioners were recorded.

Between 1961 and 1972 a detailed whale log was maintained by the ships' officers from the bridge and included hourly scans of the horizon with binoculars as well as incidental whale sightings. During this time a total of 1523 whales was sighted. However Parker (1978) noted that there was much yearly variation in the number of observations due to varying effort by different expeditioners and varying weather conditions.

Again from 1973 through 1976 the only whale sightings recorded were incidental sightings made by the ships' crews or interested expeditioners.

In the 1976/77 season another detailed whale log was kept. During some of these voyages a continuous watch was maintained for 4 hours per day by Parker with the aid of binoculars from the observation deck of the *M V Nella Dan*. Parker (1978) discussed the variable nature of the data noting that the methods used in 1977 produced considerably more sightings of whales than earlier ANARE methods. During 1976/77 a total of 532 whale sightings was recorded. Low numbers of blue, fin, humpback and right whales were sighted compared to the relatively high numbers of sei and minke whales.

Ensor (1989) presented whale observation data collected during the ANARE seal survey cruises in the pack ice zone of eastern Antarctica from October to December 1985 (off Enderby Land) and October to November 1987 (off Prydz Bay). Routine shipboard observations were conducted while cruising in the pack ice and an aerial survey was conducted from helicopters on line transects ranging up to 30 nautical miles from the vessel. Minke whales, killer whales and southern bottlenose whales were the principal whale species sighted within or near the pack ice zone during these months in both areas. In 1985 off Enderby Land the total number of whales observed was lower (no whales were observed during the aerial surveys) than the number seen during the 1987 cruise off Prydz Bay. The whales observed from the air were all in relatively open water in compact groups swimming slowly near the surface. Ensor (1989) suggested that a reason for the difference in whale sightings between the years and areas could be differences in the abundance of euphausiids (mainly Antarctic krill). In 1985 the abundance of euphausiids was apparently low off Enderby Land whereas in 1987 areas where euphausiids were observed on overturned ice floes coincided with areas where minke whales were most commonly encountered (Ensor 1989).

## RECENT DATA

The whale logs maintained on recent ANARE voyages have not been supported by an organised whale observing program and are based on incidental sightings made by biologists, bird observers and other interested expeditioners. The vessels *Lady Franklin*, *Polar Queen*, *Nella Dan*, *Ice Bird*, and *Aurora Australis* (main voyaging vessels used by ANARE since 1977) each had a warm, comfortable, glassed observation deck where the whale, seal, and bird log books were maintained.

Analysis of the whale observation data collected during ANARE voyages over the last 16 years shows a dramatic decrease in the number of whale sightings recorded. The log books record a total of 1023 sightings in the period 1977 to 1993, an average of 64 whales per year. However, in the past two seasons (1991/92 and 1992/93) a total of 252 sightings was recorded (Table 1).

The reasons for the decrease in sightings between the report by Parker (1978) and the present are varied. There are annual differences in the effort made by different observing parties, weather conditions, number of days spent at sea, voyage path (differences in the amount of time spent in the open ocean and near the pack ice) and speed of the ship (variable depending on the weather and schedule dates).

Inconsistency is the biggest obstacle to the systematic collection of data. The amount of time and effort spent on the observation deck collecting the data depends on the enthusiasm of the changing expeditioners. As the ship moves further south the scenery becomes more dramatic (pack ice and icebergs), more people visit the bridge for longer periods of time thus increasing the probability of whale sightings. Information collected in the whale logs however gives no indication of these variations.

An example of the consequences of differing cruise tracks and search efforts is best illustrated by comparing seasons 1984/85 and 1988/89. As well as the usual resupply voyages, a marine science cruise extensively surveyed the area south of 57°S during the summer of 1984/85. Much of this cruise time was spent close to the pack ice. A total of 256 whale sightings was recorded for the year of which 114 were recorded during this one marine science cruise. By comparison in 1988/89 only 52 sightings were logged in all voyages as the ships traversed almost directly between Hobart and the Antarctic continent.

Analysis of the data from 1977 to 1993 is also hampered by the difficulties involved in accurate identification of whale species from brief sightings at sea. This is very difficult even for experts thus the data collected are in many cases unreliable. The distance of the whales from the ship and the visibility were seldom recorded.

The two major problems that are evident from attempting to analyse past data are:

The inability to calculate sighting effort in different years.

The problem with identification. When an identification is made it is impossible to tell how competent or sure the observer was. The second problem of identification occurs when the observer cannot decide between two possible identifications and puts the observation down as unidentified whale.

## **FUTURE DIRECTIONS AND DATA COLLECTION**

In July 1992 at the 44th Annual Meeting of the IWC the government of France put forward proposals to designate all waters south of 40°S as a whale sanctuary in accordance with article V(1)(c) of the 1946 Convention for the Regulation of Whaling. The aim of this was to protect all southern hemisphere species and populations of baleen whales and sperm whales on their feeding grounds. The French proposal was based on the feeling that in the very damaged ecosystem of the Southern Ocean the IWC's Revised Management Procedure (proposed to be implemented on a species by species, stock by stock basis and theoretically allowing some whaling) should not apply but instead a more cautious policy looking at the whole ecosystem should be adopted.

The French proposal for a southern Ocean Whale sanctuary suggested that the Scientific Committee of the IWC be asked to draw up a long-term program for research into, and monitoring of, the southern hemisphere whale populations. They recommended that such a program should be coordinated with relevant studies sponsored by the Scientific Committee of CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) in the area south of the Antarctic Convergence and by national research organisations in the more northerly latitudes of the sanctuary. ANARE ships are the only government vessels regularly plying those waters and therefore many of the questions asked will be referred to the Antarctic Division.

What then is the role of the Antarctic Division? Regardless of any decisions about whether the Antarctic Division should or should not become involved in whale research, the simple monitoring of whales should be put on a more professional basis. The optimal amount of information collected for each sighting on ANARE voyages is suggested in Table 2 and will become the basis of whale observations on future voyages.

The question to be asked in regard to whale observations is whether to persist with observations by inexperienced observers or whether experienced observers should be engaged to improve the reliability of the data, but possibly at the expense of reduced coverage. If it is decided to continue with inexperienced observers, how is the reliability of the data to be increased?

To improve the reliability of species identification by inexperienced observers it may be beneficial to use a coded format such as the one described by Frost and Best (1976). Most methods provide a key or photographic index from which positive identifications are expected of the observer. The major problem with this method is that the criteria by which a whale is identified are not retained so that a suspect identification will always be suspect and an unidentified whale will always remain in this category. Frost and Best (1976) devised a method whereby the most useful identifying features are looked for preferentially and are recorded in a standard and systematic manner with no real need for the observer to make an identification. These data can then be used by an expert either to identify the whale or at least to narrow down the possibilities. Features recorded include the general body shape, blow shape, blow frequency and synchronisation within the group, swimming behaviour and reaction to the vessel, exposure of the tail flukes, dorsal fin position, height, shape and colour, head shape, body colour and colour pattern and flipper shape and colour. The implementation of this scheme, together with the collection of photographs of each sighting, could reduce the whales in the unidentified category and make the data set more reliable.

Australian and foreign government vessels usually operate in Antarctica on fixed transects with tight schedules and little time for deviating off track for whale investigations. The placement of experienced observers on these ships therefore restricts the time and space over which data on whales can be collected (however accurate those data may be). However, there is a vast potential for spatial and temporal coverage of Antarctic waters in the number of cruise ships visiting Antarctic water each year.

The tourism potential of the Antarctic and Southern Ocean has resulted in an increasing public interest and awareness in the area and its ecology. Gradually more and more tourist ships have visited during the summer months, each providing potential for whale observation data collection. In the summer of 1992/93, for example, 59 tourist ships visited the Antarctic and the expected number for 1993/94 is 64 ships. The area traversed by these ships will be outside the usual ANARE resupply routes, thus providing the opportunity to increase the area surveyed for whale sightings.

This is a resource that could be tapped because ecotourists tend to be enthusiasts and are often accompanied by experts who can demonstrate the identification points of whales.

## **CONCLUSION**

Up until now whale research in the Southern Ocean has played a minor role in the ANARE scientific research effort. The lack of knowledge of whale biology, distribution patterns, feeding grounds, population numbers and life cycles will become evident when decisions are made to manage a whale sanctuary or if commercial whaling is to continue. The cheapest and easiest way to begin collecting distribution data on Southern Ocean whales is by using existing voyages under the auspices of either government or private enterprise, to collect data on the distribution of whales, perhaps in association with marine science cruises or together with some other indication of food abundance such as bird sightings (Hodges and Woehler in press).

TABLE 1 Whale sightings over sixteen shipping seasons.

Season	Whales	Days	Whales/day
77/78	61	53	1.15
78/79	32	22	1.45
79/80	45	33	1.36
80/81	19	27	0.70
81/82	56	42	1.33
82/83	29	46	0.63
83/84	7	21	0.33
84/85	256	165	1.55
85/86	34	112	0.30
86/87	79	120	0.66
87/88	28	184	0.15
88/89	52	40	1.30
89/90	61	188	0.32
90/91	16	16	1.00
91/92	132	194	0.68
92/93	122	218	0.56

In an attempt to standardise effort the number of days for each voyage was calculated from the first to the last sighting of a whale. These were then summed for the season.

TABLE 2 Proposed whale sighting sheet

Name of observer making entry			
Vessel	Voyage	Season	Date
Time whale observation effort began		Lat.	Long.
Time whale observation effort finished		Lat.	Long.
<b>Observing conditions</b>			
Ship activity	Speed	Course	
Cloud	Windforce	Winddir	
Airtemp	Airpress	Precip	
Sea state	Sea temp		
Icebergs	Seaice	Vis	
Salinity	Depth		
<b>Whale details</b>			
Species code		Swimming past	
Distance		Surfacing	
Pod number of		Breaching	
Total count		Blowing	
		Moving thru ice	
		Following	
		Porpoising	
		Frolicking	
		No record	

All details will be coded, this to appear on the reverse side of sightings sheets.

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