Colonial behavior of Weddell seals in eastern McMurdo Sound

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Studies were conducted on the Weddell seal population of McMurdo Sound from 7 October through 14 December 1978. Our objectives were to continue population estimates using mark-recapture techniques, to obtain growth curves on a representative sample of pups from birth to six weeks of age, to examine relationships between mother-pup behavior and variations in pup weight, and to obtain samples of underwater vocalizations prior to the pupping season.

Although this seal population appeared to be stable in the period from 1966 to 1968 (Stirling, 1971), it apparently has been declining slowly in the past four years as evidenced by the decline in the production of pups (figure 1). Other data on this decline are currently being evaluated.

Seber-Jolly population estimates (Seber, 1974) and basic counts from this season's census work are summarized in the accompanying table. During this season, a total of 322 seals were tagged (34 adult males, 44 adult females, 5 subadults, 2 yearlings, and 239 pups) and 23 individuals with lost tags were retagged. The estimates presented in the table are preliminary, in that they were made prior to final check procedures on the data. They are being further refined and compared with previous data to calculate estimates of survival and fecundity that will be considered in later publications.

Traditionally, Weddell seals congregate in pupping colonies north and south of the Erebus Glacier Tongue (Siniff et al. 1977). We wondered if the apparent decline could be attributed to establishment of new pupping colonies in other parts of the sound, or if nonreproductive adults were congregating elsewhere. We conducted helicopter surveys (see figure 2) along the west coast of the sound, from the stranded moraines to New Harbor (A, in figure 2), along the coast from Cape Evans to Cape Bird (B), along the coast of Lewis Bay (C), and in the middle of the sound from north of Cape Evans to McMurdo (D). Seals in groups of three or more were checked for tags. Area (E) in figure 2 gives the results of a ground census conducted at about the same time in the study area.

Significant pupping colonies were found along the coast of Lewis Bay. In this area, 6.5 percent of the females with pups and 14 percent of the nonparous females carried tags attached in eastern McMurdo Sound during previous years. These observations contrast with previous observations where no females tagged in the study area were found pupping outside the area (Stirling, 1969). However, the proportion of tagged to untagged adult females (about 8 percent) compared to the proportion for the study area (47 percent) indicates that the population decline cannot be attributed to a large emigration from the study area. Also, the relative proportion of tags we found outside the area is similar to that found by Stirling (1969), even though we probably have a larger proportion of the adult females marked. In addition, there does not appear to be any significant change in the distribution of pupping areas in McMurdo Sound.

As postulated by Siniff et al. (1977), juvenile survival may be important in regulation of this population of Weddell seals. Postweaning dispersal of pups was investigated in the previous year (Thomas et al., 1978). During the 1978 season, we focused on preweaning behavior and weight gain of pups. Twenty-one pups from the Hutton Cliffs and Turtle Rock colonies were weighed at weekly intervals from birth to the age of seven weeks. In general, individual differences at birth were magnified during growth. These data are currently being analyzed to determine factors possibly contributing to the variations in weight gain.

It was postulated that differences in pup weights may be attributed to maternal behavior. To investigate this possibility, behavioral observations were made on seven mother-pup pairs at the Hutton Cliffs colony. Total observation time for individual pups ranged from 15.5 to 28 hours over a period of 25 days. All interactions

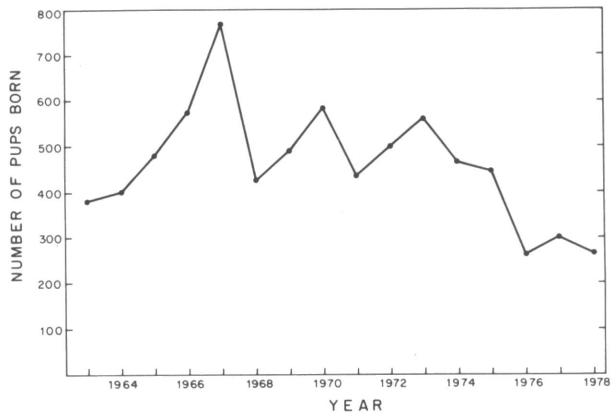

Figure 1. Annual Weddell seal *(Leptonychotes weddelli)* pup production, 1963 to 1978, showing general decline in numbers.

Table 1. Summaries of Weddell seal census data for eastern McMurdo Sound, 13 November to 10 December 1978

Category	(a) Number of Weddell Seals Counted at Each Census 13 Nov	17 Nov	22 Nov	25 Nov	30 Nov	5 Dec	10 Dec
Females/pup	202	190	134	155	197	160	90
Nonparous females	93	83	93	147	172	203	198
Males	63	43	41	42	58	71	80
Pups	229	216	179	205	226	202	168
Totals	587	532	447	549	653	636	536

Category	(b) Number of Weddell Seals Estimated using Saber-Jolly Mark-Recapture Procedures 13 Nov*	17 Nov	22 Nov	25 Nov	30 Nov	5 Dec	10 Dec*
Females/pup		239	252	237	261	216	
Nonparous females		200	241	234	229	261	
Males		70	94	86	78	92	
Pups		276	257	276	263	253	
Totals		785	844	833	831	822	

* Saber-Jolly estimates not available for first and last census periods.

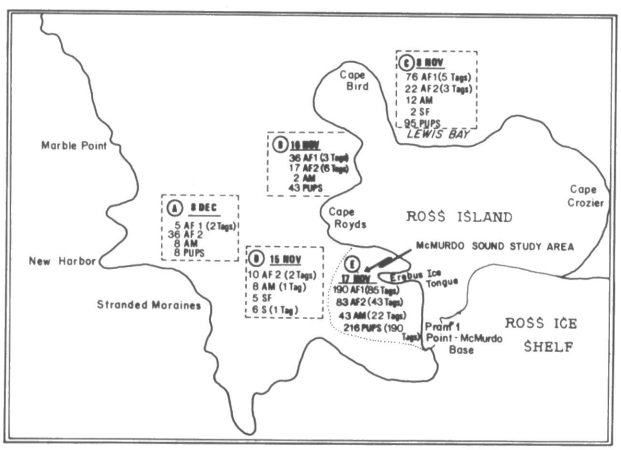

Figure 2. Censuses of Weddell seals in the McMurdo Sound area.

within an observation period (usually one hour) between mother and pup were recorded; activity levels and type of body contact were recorded at five-minute intervals.

Preliminary analysis suggests that individual variation in behavior of pups is greater than variation in behavior of mothers. If mothering behavior influences pup growth, it is more likely to be attributable to patterns of haulout than to behavior during haulout. Variations in the weight and behavior of pups suggests a complex interaction among such factors as nutritional status and haulout pattern of the mother, the birth weight, suckling behavior, and haulout and activity level of the pup.

Samples of underwater vocalizations were obtained prior to the pupping season to supplement studies done during the pupping season in the previous year. This information is included in an extensive study of Weddell seal vocalizations (Thomas, 1979).

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