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THE BEHAVIOR AND POPULATION STRUCTURE OF SEA OTTERS TRANSPLANTED TO
VANCOUVER ISLAND, BRITISH COLUMBIA

Morris et al. 1978

Bigg and MacAskie (1978) conducted aerial censuses for sea otters along the northwestern Vancouver Island coast during 1977 and reported finding up to 55 at Bunsby Islands and 15 at Bajo Reef, 80 km to the southeast. These were survivors of 89 transplanted from Alaska to the Bunsby Islands in 1969-72. The species had been extinct in B.C. since about 1930. This note gives the results of the first behavioral study of sea otters at the Bunsby Islands, conducted by us in June and July, 1978. It also gives the results of two aerial censuses at this site and at Bajo Reef by staff of the Pacific Biological Station, Nanaimo, B.C. on June 15, 1978 and by the B.C. Fish and Wildlife Branch, Nanaimo, B.C. on February 19, 1979.

Observations were carried out in Checleset Bay (Figures 1 and 2) from June 1 - July 4 and July 12 - August 1, 1978. An initial reconnaissance (June 1 - 3) for sea otters by means of inflatable boats tended by the 17 m University of Victoria oceanographic vessel, the MSSV John Strickland, located sea otter rafts and individual animals in reef areas 2 - 6 km to the southwest of the Bunsby Islands. Subsequently, two observers (R. Morris and B. Emerson) operating from a base camp on Checkaklis Island utilized a 4 m aluminum skiff and a 5 m Canova inflatable to reach observation points on Gull Island, Bleeding Rock, Dozing Rock, Deer Island, Mid Rocks, Farout Reefs, and a reef 75 m south of Humpback Island. When rough sea conditions made landing at these

locations hazardous, lookout points on Checkaklis Island and Cautious Island were utilized and with good visibility sea otters near Humpback Island and closer inshore could be sighted with a spotting scope. For July a blind was constructed on Gull Island to observe sea otters' activity there at dawn and dusk. The inflatable boat was used to extend the surveys for sea otters along the south coast of the Brooks Peninsula, into the Bunsby Islands, the Cuttle Islets, the Barrier Islands, and the Mission Group and along the coast of Vancouver Island between the Bunsby Islands and the Mission Group. Observations were made with a 25X spotting scope, 10X50 binoculars, and 35 mm camera with 400 mm lens.

During observations of sea otters the following information was recorded: location, number counted, behavior, direction of travel (non-stop, unidirectional swimming), food-types consumed, and significant environmental influences such as weather and sea conditions, potential predators, and reef and kelp bed habitat. Details are recorded in Morris et al. (Ms) available from the authors. To obtain an estimate of age structure in the population, pelage coloration and relative body size of individuals was recorded. A whitening of the pelage, particularly on the head, indicated advancing age, or "older" adults (see Kenyon, 1969; Loughlin, 1977). Similarly, grey-headed animals, or those with white and brown mixture, were taken to be younger adults. Juveniles had slimmer bodies than adults, and usually a darker brown coloration throughout

their pelage. Pups were small, usually light brown, fuzzy animals which stayed close to their mother, or rode upon her chest. The sex of individuals was determined by the penile ridge on males and mammarys on females, with a heavier build through the head and neck aiding in adult male identifications (see Kenyon, 1969).

The Bunsby Islands sea otters used three main rafting areas in June and July. During the day rafts of varying size were located at both the east side of Humpback Island and the north side of Farout Reefs. Virtually simultaneous counts at midday on July 25 recorded 13 individuals rafted at Humpback Island, and 35 individuals at Farout Reefs. Maximum counts of 38 (June 20, 21) and 40-50 (June 13) individuals were recorded at these two locations, respectively. In July, at the east side of Gull Island, a raft of 5-25 individuals usually formed by dusk (approx. 2200 h) and dispersed soon after dawn (approx. 0530 h) the following day. Counts of individuals in this raft made at dusk and following dawn showed increases between these times (July 15, 17, 18, 24, 30) and decreases (June 25, July 2) and this may indicate nocturnal movement to and from the raft position. Two dawn counts at both Gull and Humpback Islands recorded 21 individuals (July 24) and 12 individuals (July 25) resting at the two locations. This indicates simultaneous overnight use of both these rafting areas. Although Farout Reefs was not similarly censused at dawn, the remaining sea

otters probably stayed there overnight. Unfortunately, throughout the investigation period, regular observation at Farout Reefs was limited because of constant wave surge at that more exposed location. However, the frequency of Humpback and Gull Islands totals which were below the maximum counts recorded indicate Farout Reefs was the preferred rafting location for the majority of sea otters in June and July.

The aerial census on June 15 confirmed the rafting pattern described above. Fifty-one sea otters were sighted in Checleset Bay: 23 in a raft at Humpback Island and 28 in a raft at Farout Reefs. Also, 16 individuals were sighted at Bajo Reef. These counts are similar to those reported in 1977 (Bigg and MacAskie, 1978). At that time 55 individuals formed one raft at Farout Reefs.

A significant variation in the these rafting patterns occurred during the only storm period observed (June 6-13) when a raft of 10-45 individuals was recorded at Gull Island during the day and evening. With abatement of the storm, the maximum count of 40-50 individuals was recorded at Farout Reefs (June 13). This suggests movement from the more exposed rafting areas at Humpback Island and Farout Reefs to the relative shelter of the inshore reefs during storms. Such local movements in response to storms have been observed in Alaska (Kenyon, 1969) and California (Shimek and Monk, 1977). Severe winter gales, a predominant weather pattern on the west coast of Vancouver Island, may result in a movement further

inshore to more sheltered reef areas adjacent to the Bunsby Islands. The aerial census on February 19, 1979 located 15 individuals midway between Gull and Cautious Islands, with none sighted at Humpback Island and Farout Reefs. Kelp beds (Nereocystis luetkeana and Macrocystis integrifolia) used for rafting by sea otters during the previous summer appeared largely intact at that time. The whereabouts of the approximately 35 remaining Bunsby Islands sea otters was not determined. None were seen at Bajo Reef, also an exposed area. The sea otter response to storm activity and the winter season on the Vancouver Island coast requires further investigation.

Adult sea otters segregated by sex (see Kenyon, 1969). Adult females, some with pups, and juveniles of both sexes formed rafts at the three main rafting areas. A maximum of 10 females with pups was recorded in a raft of 45 individuals (June 12) and 10 juveniles in a raft of 26 individuals (June 9). Individual adult males were seen consistently at three locations removed from these rafts - two males at Deer Island, one at Burial Cave Island and one at Cautious Island. Male rafting areas were not located. Two copulations (June 18, 2015h; June 19, 0630h) were observed by a pair which remained at Dozing Rock for three days (June 18-20).

Boat surveys of Checleset Bay located individual sea otters twice between Thomas and Deer Island (June 7, July 22) and once east of Acous Island (June 12). Two individuals were reported in

the Cuttle Islets in June by J. Willows, a filmmaker working in the area. Sex or age of these individuals was not identified.

The aerial census in June indicated that the sea otter population at the Bunsby Islands and Bajo Reef was about the same in 1978 as 1977, with totals of 67 and 70 respectively. These counts do not show an annual increase of 10% reported in newly occupied areas of Alaska (Kenyon, 1969). This may be explained by changes still occurring in the age and sex composition of the population which might lower productivity. The introduced stock consisted of a large proportion of adults - 26% adult males, 55% adult females, and 19% juveniles and pups of both sexes (from Bigg and MacAskie, 1978). On the basis of head coloration (Table 1) the age structure in rafts currently at the Bunsby Islands is 12% older adult females, 47% younger adult females, and 41% juveniles of both sexes. For comparison, the introduced juvenile stock represented 26% of the female and juvenile segment of the original population. This indicated an increase by 1978 in the juvenile, non-reproducing segment of the population which could contribute to low productivity.

The predominant food item of sea otters at the Bunsby Islands was tentatively identified by size, shape and color through a spotting scope as the butterclam, Saxidomus giganteus. Other food items identified were Echinoderms (Strongylocentrotus franciscanus, S. purpuratus, S. droebachiensis, Pisaster spp.), Crustaceans

(unidentified crabs), Molluscs (Mytilus californianus, Cryptochiton stelleri, and, tentatively, Turbo spp. and Tegula spp.). Most foraging took place east of Gull Island and north of Bleeding Rock and in the area enclosed by Dr. Rock, Mid Rocks and Humpback Island in water less than 20 m depth. It occurred most frequently early to mid-morning, and through the evening, with rest and grooming in kelp beds at the main raft locations the predominant activity between these times. SCUBA surveys of invertebrates located very little macrobenthos and virtually no urchins nor abalone near Gull, Burial Cave and Deer Islands and Dozing Rock. A similar survey by the Pacific Biological Station, Nanaimo, in 1972 soon after the sea otter transplants revealed concentrations of urchins of up to $25/m^2$ in these areas. Thus there appears to have been a reduction in macrobenthos since 1972. Some reduction of abalone and urchins, however, may be due to the occasional commercial harvests in the Bunsby Islands area (Dave Smith, British Columbia Marine Resources Branch, personal communication).

Travel by individuals and pairs of animals (especially females with young) between raft locations was recorded. Rafting, foraging and travel activities mainly took place within a triangular area (9 km^2), with Humpback Island, Farout Reefs and Gull Island forming the apices. The consistency of occupation of this area indicates it was functioning as a home range for at least the females and juveniles during June and July. No hauling out on shore was observed.

Social interactions observed consisted of mothers nursing and grooming their pups, and teaching them to swim (see Kenyon, 1969), sharing of food by mothers with larger pups, and play of larger pups and juveniles. An instance (July 1) of an individual rising from the water to sniff and sight us on a nearby reef and then swimming quickly into the midst of, and dispersing, a small resting group may be a form of the watchdog behavior pattern described by Fisher (1939). Bunsby Islands sea otters were easily disturbed, but when rafts dispersed, often into nearby reefs, they usually reformed after about 30 minutes.

One mortality was recorded on June 27. A small, live pup (female, 2.9 kg.; standard length, 65.4 cm.) was found in mid-afternoon (June 26) floating near reefs east of Deer Island with no mother evident. It was waterlogged, screamed continually, and breathing was congested. It died the following morning. The cause of death was pneumonia as determined from an autopsy performed by Judith and James McBain, DVM, Nanaimo.

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TABLE 1. - Age structure according to head coloration in female and juvenile rafts at the Bunsby Islands.

Date	Location	Time	White (older adults)	Grey (younger adults)	Brown (juveniles)
June 20	Humpback Island	1030-1200	5(1)*	16(6)	9(1)
June 21	Humpback Island	1010-1050	3(1)	14(5)	3
June 25	Humpback Island	0625-0645	2(1)	9(5)	3
June 26	Gull Island	2115-2200	1	5	5
June 27	Gull Island	0750-0830	1	2	4
June 28	Gull Island	2050-2150	3(1)	8(3)	9(1)
June 29	Humpback Island	1030-1045	3(1)	8(2)	8(1)
June 30	Gull Island	2005-2020	1	4(1)	5
	Humpback Island	2105-2145	1	2	3(1)
July 1	Humpback Island	0900-1215	3(1)	7(2)	12(2)
	Humpback Island	1935-2010	0	3(1)	3
	Gull Island	2030-2105	1	4(2)	3
July 2	Humpback Island	1045-1145	0	8(5)	8
July 3	Humpback Island	0555-0800	2(1)	7(4)	8(1)
July 17	Humpback Island	0945-1045	1	6(3)	6
July 24	Humpback Island	0615-1130	1(1)	5(1)	5(1)
July 26	Humpback Island	0815-1100	0	2(1)	3(1)
Totals			29	115	99

* Bracketed figures indicate females with pups.

Figure 1. Vancouver Island, British Columbia, showing locations of sea otter populations at Bajo Reef and Checleset Bay. Inset area is shown in Figure 2.

Figure 2. Study area at the Bunsby Islands, Checleset Bay. Sea otters occurred mainly within the area enclosed by the triangle. Rafting areas are located east of Humpback Island, north of Farout Reefs, and east of Gull Island.



