

CHAPTER 13

OIL CONTAMINATION AND ELEPHANT SEAL MORTALITY: A "NEGATIVE" FINDING

by Burney J. Le Boeuf¹

When crude oil from the Santa Barbara Channel oil spill washed up on an elephant seal rookery at San Miguel Island shortly before March 17, 1969, over 100 pups were coated with oil, sand and detritus (Peterson and Le Boeuf, 1969, unpublished report of an expedition to San Miguel Island, March 25-28, 1969). The news media acted quickly in expressing concern for the lives of these animals (e.g., San Francisco Chronicle, April 3, 1969, and Los Angeles Times, April 6, 1969). The National Park Service requested an investigation (Simpson and Gilmartin, 1970), the results of which suggest that the oil caused neither illness nor mortality. This paper presents additional data which help to evaluate the initial investigation and support the conclusion that oil-fouling had no deleterious effect on the health of elephant seal pups.

Simpson and Gilmartin spent four days on San Miguel Island between April 7 and 16, 1969, examining animals for clinical signs of sickness and collecting specimens for petroleum residue analysis in the laboratory. They found few sick animals, and no petroleum in the tissue of two dead seals examined (one of which was not coated with external oil) or in blood samples taken from live animals.

Their data are difficult to interpret in light of the methods employed and the incompleteness of the report. They

¹Crown College, University of California, Santa Cruz, California.

do not specify the age, number, or degree of oil-fouling in live animals from which blood and rectal temperatures were obtained. The logic in looking for petroleum in the body of animals as an indication of illness or mortality is questionable. One would not expect significant petroleum residues in blood or tissue unless the animals were ingesting it. This was unlikely since the rookery was contaminated after 90% of the pups had been weaned and were no longer suckling. Furthermore, weaned pups do not feed until they go to sea in late April. Thermoregulatory difficulties might be expected in animals with near-total encapsulation in crude oil. But rectal temperature readings which might reflect this difficulty are highly variable in elephant seals (Bartholomew, 1954) and Simpson and Gilmartin obtained too few recordings to answer this question. Lastly, the nature and timing of their investigation could have demonstrated only short-term effects of oil contamination--effects that might have appeared less than a month after exposure.

The question of whether oil contamination affected the mortality rate of elephant seal pups can be approached simply and directly by marking soiled and non-soiled individuals soon after the former are exposed. As part of our regular tagging program, R. S. Peterson and I attached yellow "Dalton Roto-Tags" to the hindflippers of 714 weaned pups at San Miguel Island on March 25-26, 1969, shortly after the Northwest Cove rookery was fouled (Fig. 1). The outer surface of the plastic tags were numbered from 200-1000. The inner surface of each tag bore the inscription: "NOTIFY U CALIF, SANTA CRUZ USA." The 2 x 4-1/2 cm tags are easily noticed and the numbers can be read from a distance of several meters.

Fifty-eight weaned pups and five yearlings from Northwest Cove, tagged on March 25, had bodies at least 75% covered with a mixture of oil, mud and sand (Fig. 2). An equal number of clean pups tagged on the same day in the adjacent West Cove area were selected randomly to provide a control group for comparison (Fig. 3).² Three criteria can be used in evaluating the results: (1) One would expect a higher

² Experimental animals were marked with numbers in the series 501-567; control animals were marked in the series 601-671.

mortality rate in pups exposed to oil if this exposure is detrimental to their health. (2) If the oil covering affects the animals once they have gone to sea and corpses sink or are destroyed, one would expect fewer tag sightings of live animals in the experimental group. (3) Sightings of previously contaminated animals in healthy condition and bearing no trace of oil would indicate that the substance had no serious effect on the health of these animals.

During the period between April, 1969, and June, 1970, 222 of the 714 animals tagged in March, 1969, were sighted at least once in various locations along the California Coast. This is an overall tag return rate of 31%. Only two pups were reported sick and one was reported dead; these animals were not oily when tagged. The dead animal (yellow tag 868) was coated with oil when found on April 7, 1969, at San Miguel Island.

During the 1-15 month period since tagging, 40% of the pups in the oil group were sighted as compared to 25% of the pups in the control group (Tables 1 and 2). The percentage return for the experimental group exceeds both the control group figure and the overall figure. Except for one animal in the experimental group (tag 558), whose condition was questionable, all animals in both groups were reported to be in apparent good health. The two sick pups did not belong to the randomly selected control group.

At the time the tags were read, the pelage of all experimental animals, except number 508, showed no trace of oil. Control group animals were also clean when sighted.

A seal must be healthy to swim long distances. Eight animals in the experimental group³ and eight animals in the control group were seen 408 kilometers or more north of the tagging location after November, 1969. One animal from each group was sighted at San Nicolas Island, approximately 120 kilometers south of San Miguel Island.

³Not included in this count nor in Table 1 was tag 528 which was found on a beach near Santa Cruz unattached to an animal. Since the tags do not float, the tag was undoubtedly lost by its wearer on Santa Cruz.

These data support the conclusion that the crude oil which coated many weaned elephant seals at San Miguel in March and April, 1969, had no significant immediate nor long-term (1-15 months later) deleterious effect on their health. Had the rookery been contaminated earlier in the season when females were nursing, pups might have ingested the crude oil and more serious consequences might have ensued.

On a subsequent tagging expedition to San Miguel Island on March 24-25, 1970, only a few of this new generation of pups were observed bearing small spots of oil and tar. Inspection of the beaches on the western portion of the island revealed that no significant oil deposit had washed ashore during the previous year. The only indication of a previous oil spill at Northwest Cove was dried tar on rocks and driftwood high up on the beach.

ACKNOWLEDGMENTS

I thank Donald E. Robinson, Superintendent of the Channel Islands National Monument, and Jay B. Stoddard for transportation to San Miguel Island, and Frank McCrary, Jr., for assistance in the field. Robert L. DeLong, Daniel K. Odell, Edward D. Asper, Fred C. Sibley, Jim Lewis, and several others were especially helpful in taking the time to collect and report to me information on tagged animals sighted. Observations in Año Nuevo State Reserve were authorized by the California Department of Parks and Recreation, W. P. Mott, Jr., Director. Permission to tag seals was granted by the California Department of Fish and Game, W. T. Shannon, Director. Supported in part by NSF Grant GB-16321.

REFERENCES

- Bartholomew, G. A., Jr.
1954 Body temperature and respiratory and heart rates
in the northern elephant seal. *J. Mammal.*,
35: 211-218.
- Simpson, J. G., and W. G. Gilmartin
1970 An investigation of elephant seal and sea lion
mortality on San Miguel Island. *Bioscience*,
20: 289.

Table 1

Experimental Animals Sighted 1-15 Months after Being Tagged at
Northwest Cove, San Miguel Island, on 25 March 1969

Tag Number	Initial Sighting		Latest Sighting	
	Date	Location	Date	Location
558 ^a	4/25/69	Palos Verdes, Calif.		
548	5/17/69	San Miguel I.	4/26/70	San Miguel I.
540	8/19/69	San Miguel I.		
557	8/24/69	San Miguel I.		
527	8/24/69	San Miguel I.		
529	9/25/69	San Miguel I.	4/17/70	San Nicolas I.
544	9/25/69	San Miguel I.		
520 ^b	11/2/69	near Año Nuevo I.		
521	11/3/69	Año Nuevo I.		
514	11/12/69	Año Nuevo I.	4/18/70	Año Nuevo I.
537	11/12/69	Año Nuevo I.	5/22/70	Año Nuevo I.
563	11/13/69	Año Nuevo I.		
549	12/14/69	Año Nuevo I.	5/14/70	Año Nuevo I.
555	3/12/70	Año Nuevo I.	4/3/70	Año Nuevo I.
510	3/24/70	San Miguel I.	4/22/70	San Miguel I.
567 ^c	3/25/70	Año Nuevo I.		
508 ^c	4/20/70	San Miguel I.		
536	4/20/70	San Miguel I.		
518	4/21/70	San Miguel I.		
516	4/26/70	San Miguel I.		
539	4/26/70	San Miguel I.		
562	4/26/70	San Miguel I.		
547	4/26/70	San Miguel I.		
512	4/26/70	San Miguel I.		
550	4/26/70	San Miguel I.		

^aHealth condition not specified.

^bKilled in a fisherman's net.

^cCoated with an unspecified amount of oil when sighted.

Table 2

Control Animals Sighted 1-15 Months after Being Tagged at
West Cove, San Miguel Island, on 25 March 1969

Tag Number	Initial Sighting		Latest Sighting	
	Date	Location	Date	Location
615	11/3/69	Año Nuevo I.		
613	11/13/69	Año Nuevo I.		
621	11/16/69	Año Nuevo I.	5/14/70	Año Nuevo I.
620	11/19/69	San Miguel I.	4/25/70	San Miguel I.
624	11/19/69	San Miguel I.	4/12/70	San Nicolas I.
661	11/19/69	San Miguel I.		
636	11/22/69	Año Nuevo I.		
650	11/22/69	Año Nuevo I.	5/23/70	Año Nuevo I.
657	3/6/70	Año Nuevo I.	5/20/70	Año Nuevo I.
671	4/8/70	Southeast Farallon I.		
643	4/11/70	Año Nuevo I.		
627	4/17/70	San Nicolas I.		
658	4/20/70	San Miguel I.		
628	4/26/70	San Miguel I.		
652	4/26/70	San Miguel I.		
644	4/26/70	San Miguel I.		



Figure 1. A portion of Northwest Cove, San Miguel Island, at low tide, showing crude oil deposits along the high tide mark. Elephant seal pups can be seen in the foreground and center of the picture. March 25, 1969.



Figure 2. R. S. Peterson tags a newly weaned elephant seal almost covered with crude oil. At Northwest Cove, March 25, 1969.

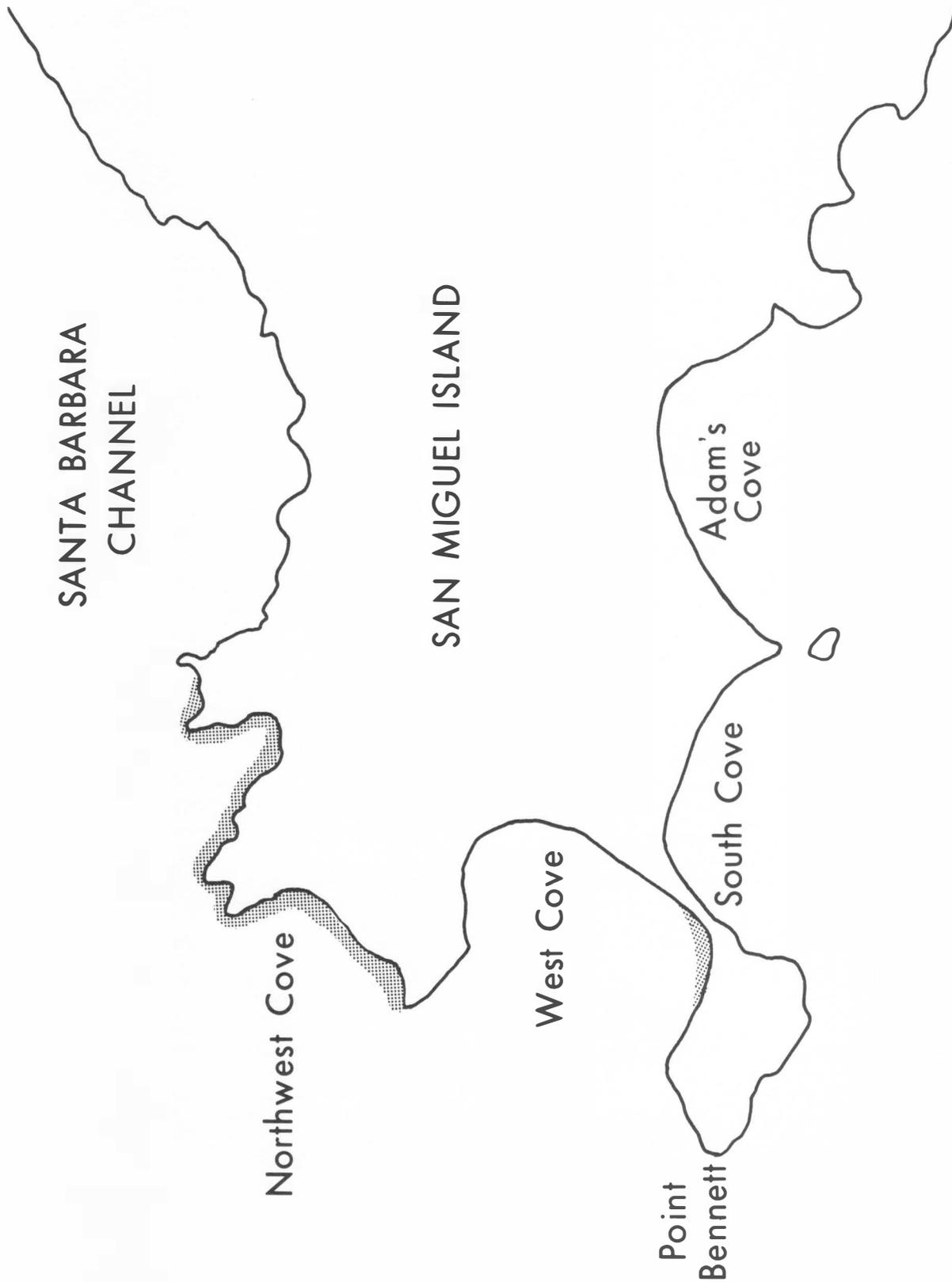


Figure 3