

SANTA BARBARA OIL SPILL—INTERTIDAL AND SUBTIDAL SURVEYS

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On January 28, 1969, Union Oil Platform-A, which is 6½ miles south of Santa Barbara, California, ruptured. By February 3, a large oil slick had surrounded Anacapa Island and was encircling the eastern end of Santa Cruz Island.

During February 5-13, California Department of Fish and Game marine biologist-divers and warden-divers established 14 transects around the islands: Anacapa, 4 and Santa Cruz, 10. The transects extended from the high tide line into depths which did not exceed 50 feet (Figure 1). Visual observations were made as to the presence or absence of oil and its apparent effect upon the marine life. Table 1 summarizes our observations. Subsamples, scrapings, or counts within a measured quadrat, were taken in areas inundated by oil.

In general, during our February 1969 survey, the various animal and plant assemblages observed appeared normal. However, some plants and animals in

the intertidal area, from the splash zone to just below low tide, were coated with varying amounts of oil. Oil was observed on the surface canopy of many of the kelp (*Macrocystis*) beds, but most of this oil could be easily shaken off. During the storm, the kelp beds were cleaned by the rough waters. The surf grass, *Phyllospadix torreyi*, at Anacapa Island was heavily coated with oil when the initial survey was made on February 5. By February 14, the plants were free of oil. Subtidal plants and animals appeared untouched by the oil. Oil slicks were observed in slight to moderate amounts around both islands, particularly on both sides of the middle of Anacapa Island. These slicks of coalesced oil droplets formed dense patches up to ¼ inch in thickness which extended seaward from the shore for several hundred feet. Beached oil adhered to the intertidal rocks and driftwood in patches several hundred feet long. These patches were up to 20 feet wide, and were in lumps

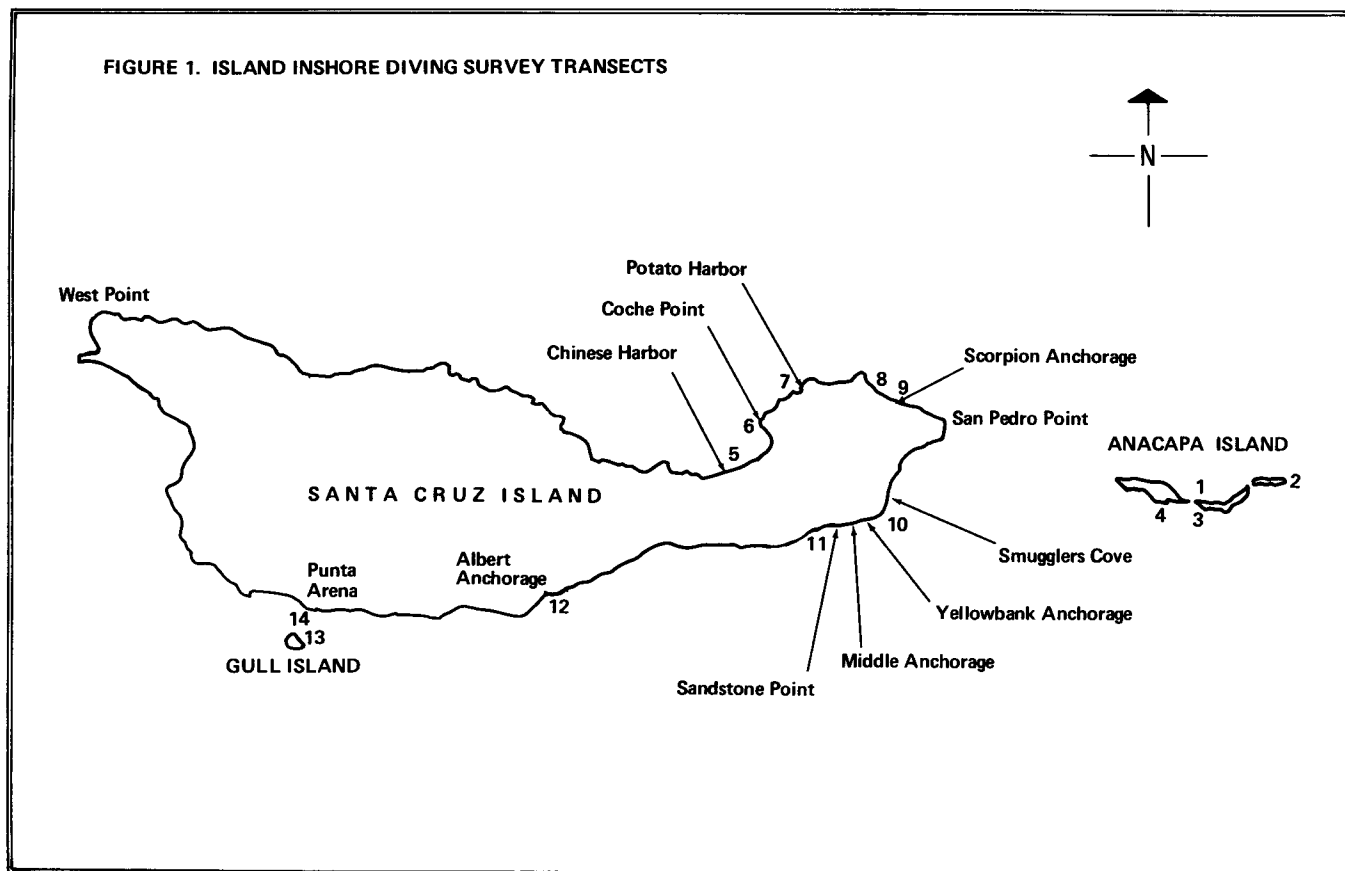


FIGURE 1. Island Inshore Diving Survey Transects.

up to 1/2 inch thick. The patches were commonest on the north side of the middle of Anacapa Island and on Santa Cruz Island at Punta Arena, Yellowbank Anchorage, Smugglers Cove, and Scorpion Anchorage. At Santa Cruz Island, major concentrations of floating oil were observed in the kelp canopy at Scorpion Anchorage and in the nearshore waters between Sandstone Point and Middle Anchorage. Topsmelt, *Atherinops affinis*, would swim up under the coalesced floating oil and investigate its lower surface. Several dead birds were observed in the kelp canopy at Scorpion Anchorage and three dead surf scoters were observed on the beach. About 35 California sea lions, *Zalophus californicus*, coated with oil, but in no apparent distress, were observed at Sandstone Point. Another group, about 300, observed in the vicinity of Coche Point, had no evidence of oil on them. The black abalone, *Haliotis cracherodii*; gooseneck barnacles, *Pollicipes polynerus*; and numerous other intertidal animals as well as the algae, *Hesperophycus harveyanus*, *Pelvetia fastigiata*, and surf grass, *P. torreyi* were heavily coated with oil at Punta Arena. On the north shore of Anacapa Island, numerous oil droplets were suspended in the water column from shore seaward about 100 feet. These droplets appeared to be adhering to organic detritus, wood chips and grass, which had washed into the sea during the recent rains. Although visible in the surge zone throughout

TABLE 1
Diver Observations and Collections at Anacapa Island

Species	Number
Algae.....	33
Invertebrates.....	62
Vertebrates (marine fishes).....	19
Marine mammals.....	2

Diver Observations and Collections at Santa Cruz Island

Species	Number
Algae.....	48
Invertebrates.....	100
Vertebrates (marine fishes).....	35
Birds.....	3
Marine mammals.....	1

the water column, these droplets did not adhere to the substrate or the plants and animals.

On April 9 and 10, 1969, we resurveyed the transects previously established in February. The plants and animals appeared normal, except that there was some question as to the healthy condition of the surf grass at Anacapa Island (Transect I) and one alga at the Punta Arena Transect. The surf grass at Transect I, which had been heavily coated with oil on February 5 and appeared clean on February 14, had turned yellow at its base. Normally, the entire

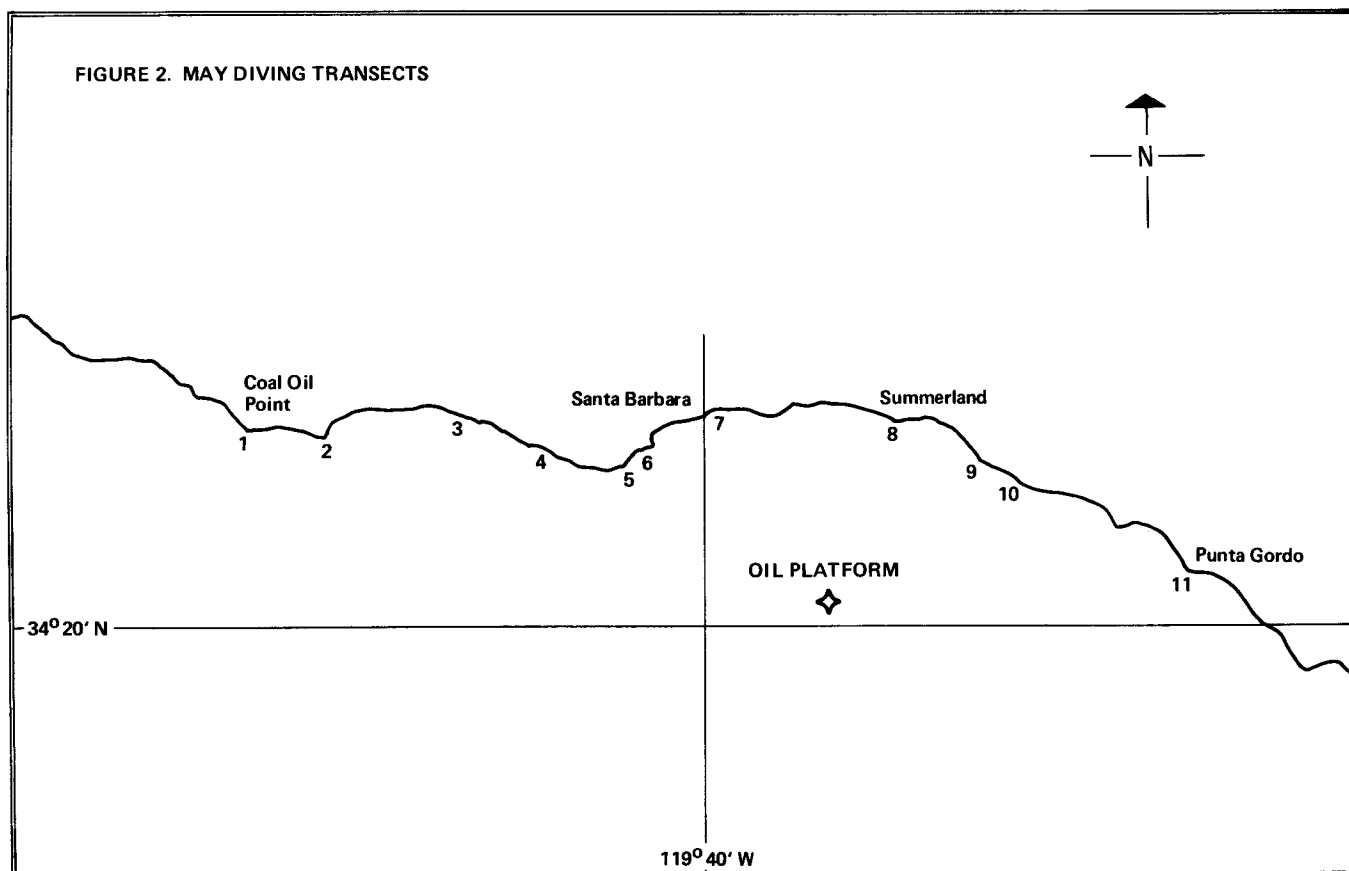


FIGURE 2. May Diving Transects.

plant is green. The alga *H. harveyanus* at Punta Arena, which was heavily coated with oil on February 13, was apparently absent. The only concentration of floating oil observed was on the north side of the middle of Anacapa Island. Again the plants and animals observed appeared to be free from the oil. The oil on the shells of mollusks in the intertidal areas had hardened by the time we made our August 1969 survey; nevertheless, the animals were still healthy. While oil had hardened on some of the rocks, invertebrates in the area were in good condition and appeared unharmed by the oil on their habitat. At Punta Arena the alga *H. harveyanus*, which was heavily coated with oil on February 13, 1969, and nearly absent on April 10, was again observed in near normal quantities. On August 6, numerous young plants (one to two inches long) were recorded at this station. Apparently only the adult plants had been adversely affected by the oil slick coating in this area. With the oil nearly dissipated, the exposed rock was again acceptable habitat for this alga. The only oil noted at either island was in small patches which had adhered to the rock surfaces above the high tide line, or on material buried by 3 to 4 cm of cobble on the beaches.

The fourth, and final survey around the islands, was conducted during February 1970. The alga, *H. harveyanus* at Punta Area had attained lengths of 4 to 5 inches. The only oil noted was at the same locations as during the August 1969 survey.

During each diving survey, the California spiny lobster, *Panulirus interruptus*, was observed at a number of stations. All appeared to be healthy. Commercial lobster fishermen in the area reported that when a trap was brought to the surface the oil floating on

the water would adhere to a trapped lobster's shell and kill the lobster. From diving observations, it appears that as long as the lobsters were not covered by the oil film, they suffered no ill effects. Since lobsters occur below the intertidal zone, the lobster resource exhibited no known damage as a result of the oil leak.

No deleterious effects due to oil, on invertebrates in the subtidal areas along the mainland, were observed on 11 transects in our May 1969 survey (Figure 2). Oil was encountered on several of the beaches, on the water surface at several locations, and on the bottom at Coal Oil Point.

Several factors contributed to keeping the loss of marine life to a minimum: the oil flowing from the blowout was of such a gravity that it floated on the water's surface; the use of dispersants, detergents, or other chemicals was prohibited in State waters; and as a result of the January floods the beaches and inshore waters had great quantities of flotsam and jetsam on them which helped to absorb the oil.

SUMMARY

There was some initial damage to certain algae and a surf grass on the Channel Islands, but later surveys revealed that these plants had recovered. The invertebrates generally appeared to have remained healthy and viable. Our surveys indicated that all the fish observed were free from oil, and showed no signs of starvation due to oil on the plants and animals in their food chain.

Speciation diversity appeared to have remained the same as before the oil leak. During our diving survey, we found no indication that there had been any modification in the number of species present.