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**DIABLO CANYON POWER PLANT SITE ECOLOGICAL STUDY
QUARTERLY REPORT NO. 19**

January 1 - March 31, 1978

by

**Daniel W. Gotshall
Laurence L. Laurent
and
John J. Grant**

**PACIFIC GAS AND ELECTRIC COMPANY
COOPERATIVE RESEARCH AGREEMENT 5-26-77**

MARINE RESOURCES

78-10

Administrative Report No. 10

May 1978

DIABLO CANYON POWER PLANT SITE ECOLOGICAL STUDY^{1/}

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ABSTRACT

Field work was limited to monitoring permanent intertidal and subtidal stations. Only a few stations were surveyed due to a long series of winter storms which produced large seas.

Office and laboratory work was devoted to completing computer data sheets for keypunching, completing the 1976/77 annual report and several quarterly reports, and processing the remaining algae samples collected at subtidal and intertidal stations in 1977.

Sea otter activity increased in South Cove and Diablo Cove where sea otters were observed on five out of 20 observation days.

^{1/} Marine Resources Administrative Report No. 78-10, May 1978.

^{2/} Operations Research Branch, Post Office Box 98,
Avila Beach, California 93424.

This is the 19th quarterly report submitted in partial fulfillment of Research Contract No. 5-26-77 between the Department of Fish and Game and the Pacific Gas and Electric Company. Through this contract, the Department of Fish and Game is to conduct ecological monitoring studies to determine what changes have occurred since 1970 and 1971 in the baseline inventory of the marine biota, with species references to fishes and abalones.

Quarterly reports will be followed by annual reports. Full tables and species lists will be included in each annual report.

Submitted To:

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Submitted By:

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INTRODUCTION

A long series of winter storms curtailed most of our field work. Intertidal surveys were hampered by large storm-generated seas and subtidal activity was impossible due to the rough dirty water.

Our quarterly reports are interim progress reports and do not function as Department of Fish and Game environmental impact reports.

OPERATIONS

Most of our time was concentrated on completing all of the data sheets for keypunching. Several discussions were held with Department statisticians regarding analysis methods of the data for the final report. Processing of the remaining intertidal and subtidal algae samples continued at a rapid pace with the hiring of two graduate student assistants. We hope to complete the processing by the end of May. Several permanent stations were remarked and surveyed. Only one permanent subtidal station was surveyed.

METHODS

Permanent Subtidal Stations

Two divers count selected species of invertebrates and brown algae 1 m to either side of a 30-m transect (60-m² area). Fishes observed in the area are also recorded.

Permanent Intertidal Stations

Counts are made of abalones 1 m to either side of the transect. Each transect varies in length from about 25 to 30 m. At some permanent intertidal stations, we also make counts of selected macro-invertebrates.

Sea Otters

Counts are made with binoculars usually once daily, weather permitting,

in the Lion Rock Cove, Diablo Cove, and South Cove.

NORTH CONTROL AND PERMANENT CONTROL STATIONS

Subtidal Activities

Invertebrates

Results

The long series of winter storms prevented us from completing surveys of the permanent stations.

Intertidal Activities

No random intertidal stations in the north control area were surveyed during this quarter. Sampling has been restricted to monitoring of permanent stations. Just one of the two control stations north of Diablo Cove was surveyed for abalone (Figure 1).

The permanent control station south of Diablo Cove, station P-3, was also surveyed during this quarter.

Results

The counts at station P-1 were 229 black abalone and 0 red abalone which compares closely to average counts from the previous four surveys of 221 black abalone and 2 red abalone. In addition to the counts, length measurements were made on 99 of the 229 animals.

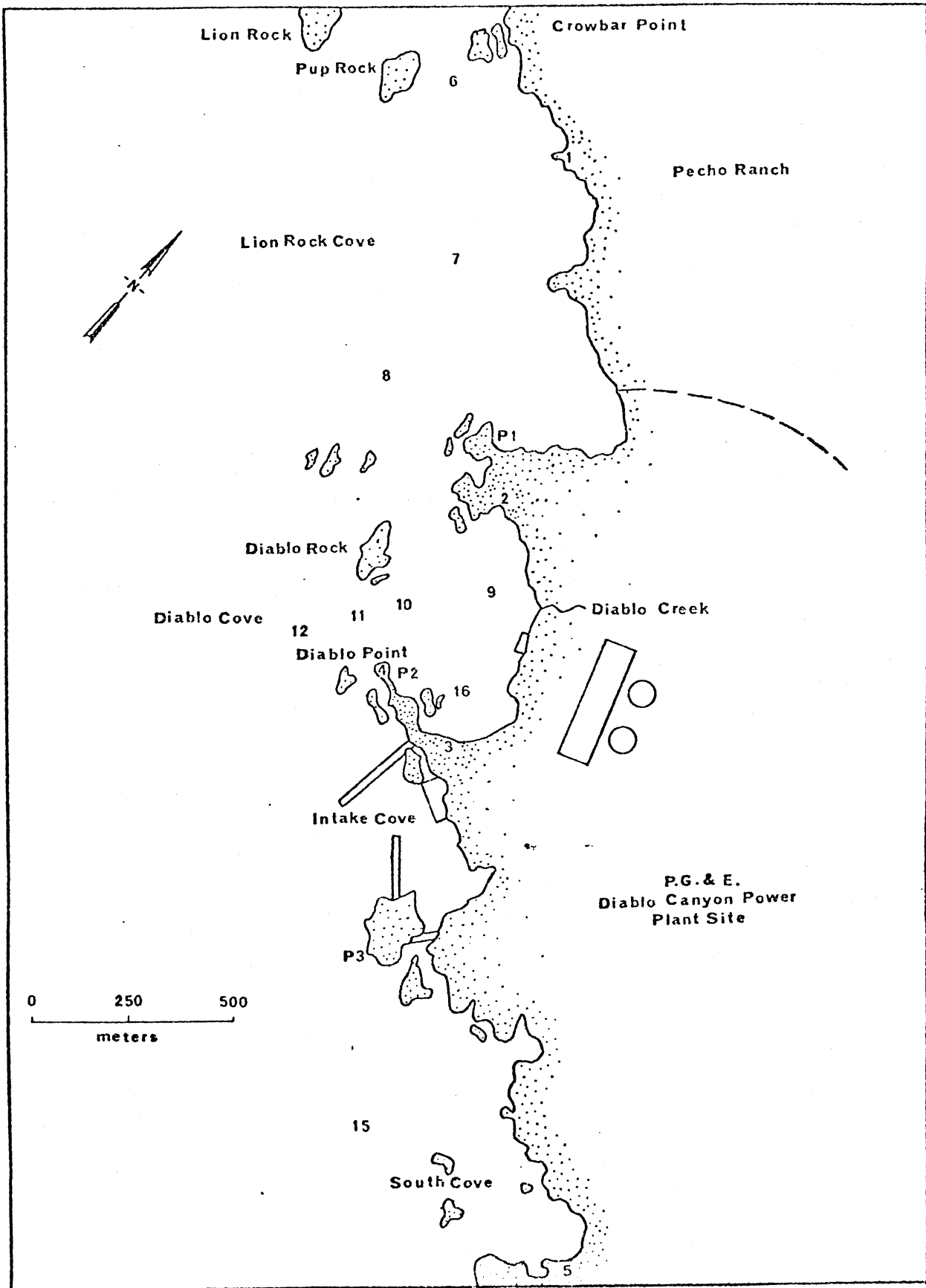
The count for black abalone was 53 which compared closely to the average of 58 abalone from the previous six surveys.

Algae

Results

Since no random surveys were conducted during this period, no algae samples were taken.

FIGURE 1. Locations of permanent subtidal and intertidal stations - Diablo Canyon Power Plant Site. Stations 1, 2, 3, P1, P2, P3 are intertidal; Stations 6, 7, 8, 9, 10, 11, 12, 15, 16 are subtidal; Stations 13 and 14 are abandoned.



Sea Otters

There were 21 observation days in this quarter. Most otter sightings were in South Cove (41 sightings) and North Cove (17 sightings) control areas. The largest aggregation observed on any one day occurred on March 1 in the South Cove area when 12 otters were sighted.

Most sightings have occurred in the latter part of the quarter. Of the 58 sightings in control areas, 51 occurred during the 10 observation days in March.

The most common sea otter activity during observation periods was foraging. The most commonly observed food item was red abalone (*Haliotis rufescens*).

Discussion

The increase in otter sightings during March is probably due to a northward movement of the large raft that had been located at Pecho Rock. This group of otters has dispersed somewhat and has moved closer to our south control area. A raft of approximately 40 otters is now located off Green Peak, one-half mile south of the South Cove area.

NORTH DIABLO COVE

Intertidal Activities

Only permanent stations 2A and 2B were surveyed here during the period.

Algae

Results

No algae samples were taken during this quarter.

Invertebrates

Results

The counts along transect 2A were 291 black abalone and 8 red

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abalone; along transect 2B there were 101 black abalone and 3 red abalone. In addition to the counts, length measurements were made on 71 black abalone along transect 2A and on 60 black and 1 red abalones along transect 2B.

Discussion

Numbers of red and black abalones along station 2A have not changed significantly from previous surveys. However, the counts for both blacks and reds along transect 2B are the lowest since the 1974 survey when they were 113 and 3 for black abalone and red abalone, respectively. The reason(s) for this apparent decline are unknown but may be related to movement of abalone boulder habitat by strong winter storm waves and/or movement of the abalones themselves.

SOUTH DIABLO COVE

Subtidal Activities

Permanent station No. 16 was relocated and surveyed.

Results

The large amounts of sand observed in this area during the past two years have disappeared. Fair numbers of red abalone were observed on and near the station beneath rocks that were previously partially buried by the sand.

Fish

Results

We observed our first adult opaleye, *Girella nigricans*, in Diablo Cove at permanent station 16. The fish, approximately 35 cm in length, was hiding beneath a large boulder. Other fish observed on this dive included grass rockfish, *Sebastes rastrelliger*; black and yellow rockfish, *S. chrysomelas*; gopher rockfish, *S. carnatus*; juvenile blue

rockfish, *S. mystinus*; cabezon, *Scorpaenichthys marmoratus*; kelpfish, *Gibbonsia* sp.; kelp greenling, *Hexagrammos decagrammus*; señorita, *Oxyjulis californica*; pile surfperch, *Damalichthys vacca*; and striped surfperch, *Embiotoca lateralis*.

Intertidal Activities

Sea Otters

Results

Only 5 sightings of otters in South Diablo Cove occurred during 20 observation days this quarter. Four of these sightings occurred in March.

APPENDIX I

MAN-DAYS SPENT AT DIABLO CANYON POWER PLANT SITE

January 1 -- March 31, 1978

Intertidal Surveys:

Subtidal Surveys:

	January 25	
Participants:	Laurent, Gotshall	
	February 15	
Participants:	Laurent, Gotshall	
	March 1	
Participants:	Gotshall, Laurent, Grant	
	March 17	
Participants:	Gotshall, Laurent	
	March 20 - 21	
Participants:	Gotshall, Laurent, Grant	
Total Man-Days During Quarter:		290
Total Man-Days at Site*:		258
Total Stations Surveyed:		1+
Travel Time Man-Days**:		22
Boat Time (Hours):		18.4

* Excludes time off for vacation, sick leave, etc. but includes both laboratory as well as field time.

** Includes all trips away from site.

Project Personnel:

Daniel W. Gotshall	Senior Marine Biologist, Project Leader
Laurence L. Laurent	Associate Marine Biologist
John J. Grant	Assistant Marine Biologist
Sally A. Barker	Stenographer
Rosemary C. Bowker	Graduate Student Assistant
Steven W. Wiley	Graduate Student Assistant