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MENDOCINO POWER PLANT SITE ECOLOGICAL STUDY FINAL REPORT

by

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ABSTRACT

A preoperational ecological study of a proposed nuclear power plant site on the Mendocino County coast was initiated in September 1971. The study resulted from an agreement between the Pacific Gas and Electric Company and the California Department of Fish and Game signed in July 1971. In the agreement, Pacific Gas and Electric Company provided funds for the Department's studies of the site.

Studies of the subtidal animal and plant communities were conducted by divers from September 1971 through March 1973; intertidal animal and plant populations were surveyed from November 1971 through February 1973. Sportfisheries for abalone and finfish were surveyed during 1972 and Spring of 1973. Stomach contents of many of the more abundant subtidal and intertidal fishes were examined.

All of these studies were designed to determine the dominant species of plants, invertebrates and fishes in the various communities, their relative abundance, and where applicable, size composition, predators and competitors.

The parameters developed from these studies would be used for comparison with similar studies conducted after the proposed plant went into operation to determine what effect construction and operation of the plant might have on the various plants and animals studied.

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INTRODUCTION

Based on an ever increasing demand for electrical energy by consumers and a call for "clean" energy sources by environmentalists, it seems inevitable that fission-driven nuclear plants will proliferate. Vast amounts of water are required to cool a typical nuclear power plant, thus many are, or are planned to be, located near ocean waters. This cooling water is raised an average of 10 C (40 F) above ambient temperature. The potential impact on our coastal waters and their contained life could be substantial. Due to this potential impact, federal and state regulations now require environmental studies be performed at every proposed power plant site.

This report covers one such study which began in July 1971 when an agreement between the Pacific Gas and Electric Company and the California Department of Fish and Game was signed. In this contractual agreement, Pacific Gas and Electric Company furnished the necessary funds to the Department of Fish and Game to conduct preoperational ecological studies at the company's proposed Mendocino atomic power plant site near Point Arena, California.

The coastline of the Point Arena area is an often rigorous environment situated on the San Andreas fault at the eastern edge of the Pacific crustal plate. The fault finds its continental terminus about 8 km (5 mi) north of the Point Arena area in the region of Alder Creek. It is the relative northwestward movement of this plate's eastern edge that has created the promontory of Point Arena which is often subjected to weather conditions usually more harsh and forbidding than the neighboring coastal areas to the north and south.

The Point Arena coastal area is characterized by high 12-61 m (40-200 ft), steep bluffs composed of stratified sedimentary rocks of the Monterey formation. These Miocene cliffs are footed by horizontally-eroded, anticlined strata which form intertidal bench areas. These bench areas generally follow coastal contours and range in widths from a few feet to more than 61 m (200 ft). The heights of the benches vary from the zero tide mark to approximately 2.4 m (8 ft) above MLLW. Surge channels and "potholes" occur regularly in these areas. Subtidally, benches continue to depths of at least 30 m (100 ft) and form reefs and pinnacles with vertical profiles from a few inches to about 9 m (30 ft).

Department biologists spent 606 man-days at the site conducting intertidal and subtidal ecological surveys, and censusing the sport-fishery in the area.

The objectives of the ecological studies were to develop quantitative and qualitative biological descriptions of the biotic communities near the proposed plant site, with particular emphasis on important sport and commercial species. Quantitative data would be used to develop simple indices or paramenters for a base line that could be compared to results of postoperational surveys to measure the effect on the various communities due to construction and subsequent discharge.

Our quantitative studies include stratified random sampling of subtidal and intertidal invertebrates and brown and red algae. A survey of the sport abalone and finfish fisheries was conducted to determine catch-per-unit-of-effort and species size and composition. Qualitative studies were conducted on the food habits of representative fishes. Species composition and interspecific relationships of the intertidal and subtidal fishes were also considered.

SUBTIDAL SURVEYS

Prepared by Daniel W. Gotshall, Laurence Laurent, Therese Hoban.

Methods

Subtital surveys were conducted in two areas: the central or outfall area, which extended from Arena Cove pier north to off the Loran station, and the North Control Area, which included the area between Sea Lion Rocks and the Point Arena Lighthouse (Figures 1 and 2). Both areas were divided into small blocks, 61 m (200 ft) on a side. Each block constituted a possible station location. In January 1972, the two areas were further stratified into shallow, mid- and deep-depth zones. The number of stations selected for each zone was based on the total area of the zone. The blocks were given permanent numbers, and stations for each survey were selected from tables of random numbers. Stations were located with the project boat, utilizing fathometer and triangulation with a hand bearing compass.

During the pre-survey conducted in September 1971, we used a 30 m X 2 m (100 X 7 ft) transect, with each diver recording the organisms within 1 m (3.3 ft) of his side of the transect. The transect was run parallel to shore with the starting point at the boat's anchor. The survey area was modified to a 30 m^2 (327 ft^2) arc after the September 1971 pre-survey because of the great changes in depth encountered along some of the 30 m (100 ft) transects. These changes in depth along the 30 m (100 ft) line resulted in a wide variety of habitat types and animal communities. The 30 m^2 (327 ft^2) arc generally provided a more uniform survey area.

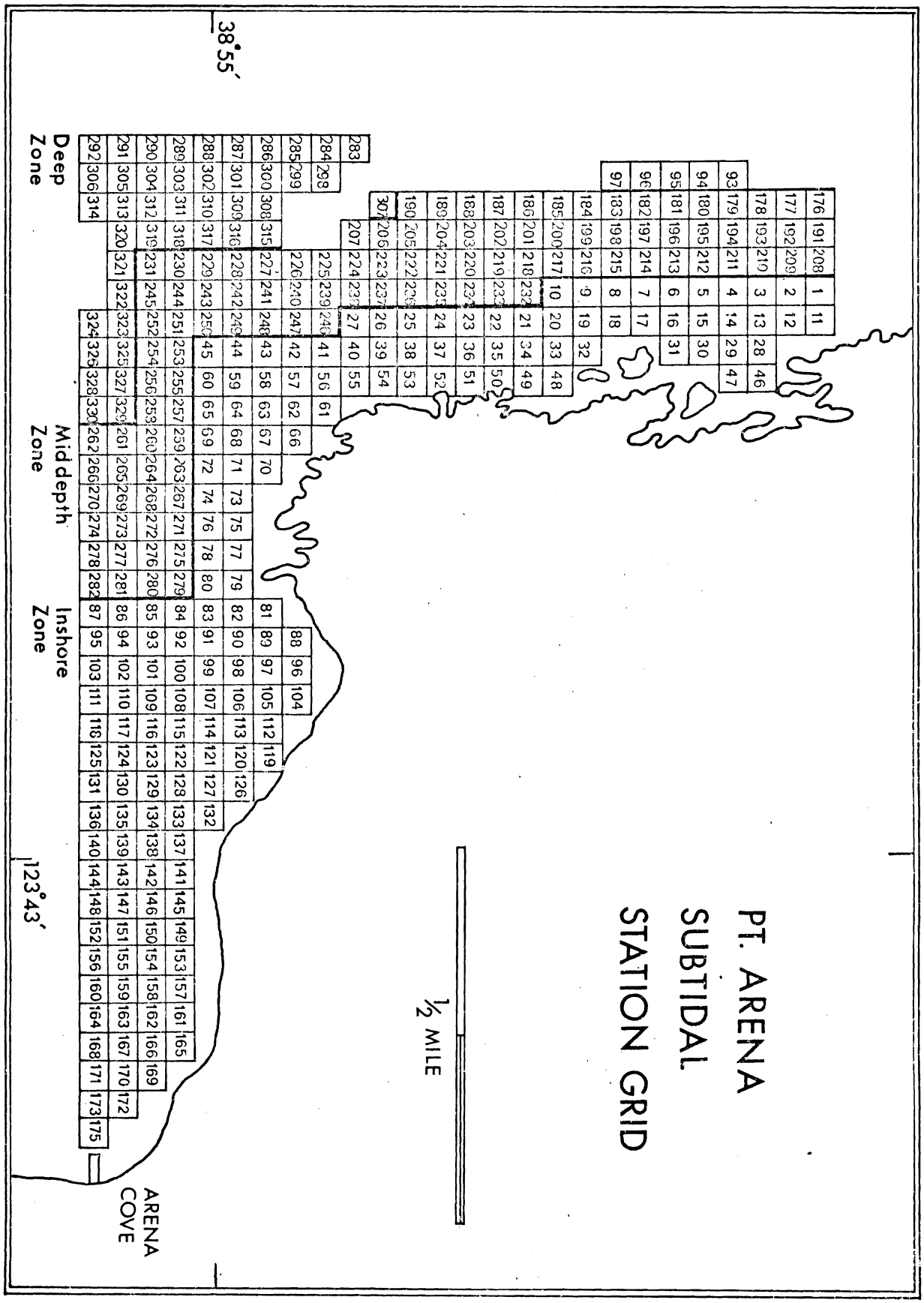

FIGURE 1. Subtidal Sampling Grid and Station Numbers - North Control Area - Mendocino Power Plant Site.

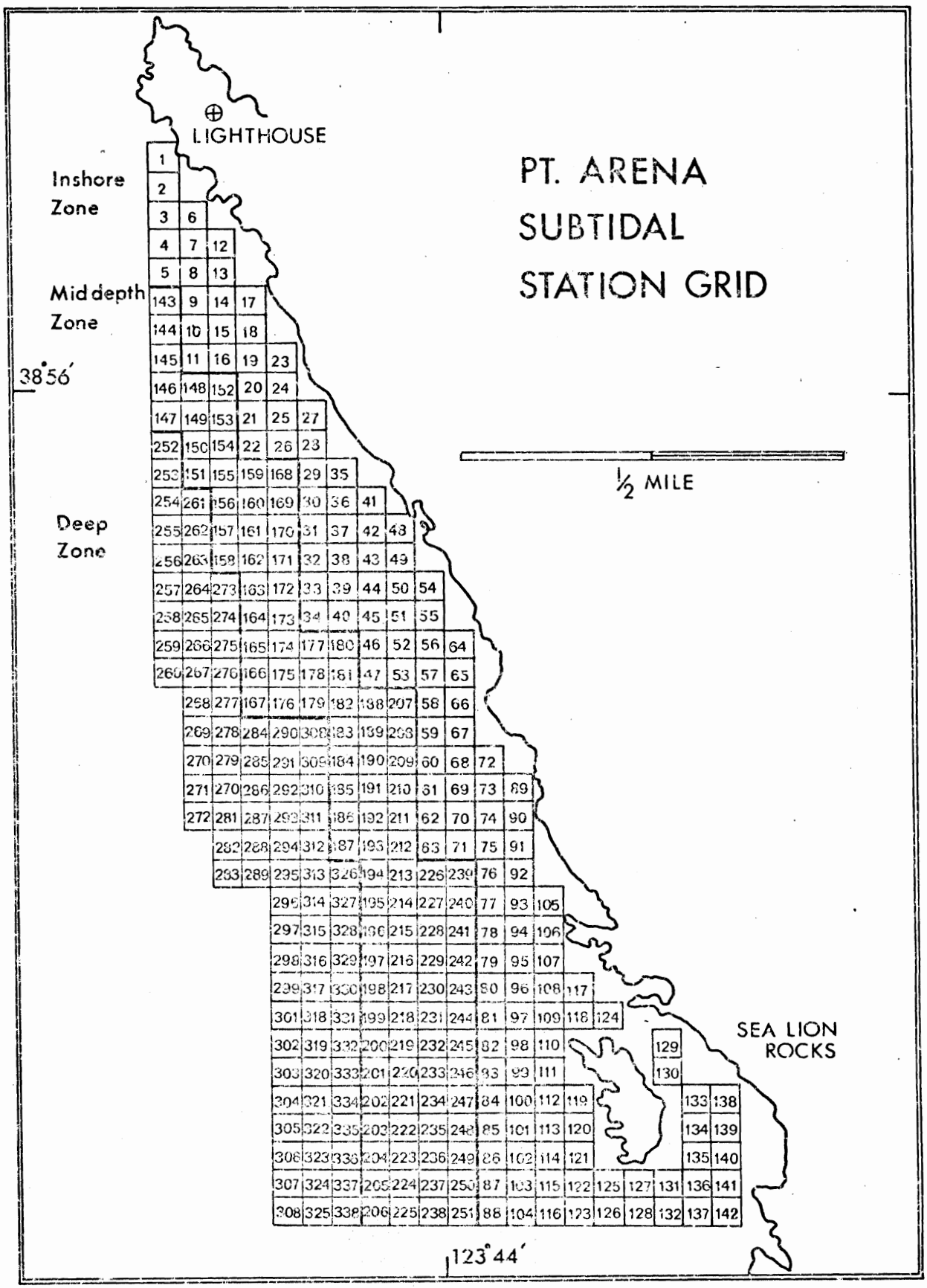

FIGURE 2. Subtidal Sampling Grid and Station Numbers - Central Area - Mendocino Power Plant Site.

All recognizable brown algae, invertebrates and fishes were recorded on plastic slates during the pre-survey, and from the resulting species list we selected 5 species of brown algae and 35 species of invertebrates that were easily identified, non-cryptic, and large enough to be easily observed by divers. Our counts did not include cryptic juveniles or adults, as we did not turn over rocks or probe into holes and crevices. Thus, our count is minimal, particularly in the case of red abalone, *Haliotis rufescens*, which as juveniles tend to hide under rocks and in crevices until they reach 9.2 or 12.2 cm (3.7-4.9 inches) in length. These plants and animals were quantified at all 30 m^2 arcs beginning in January 1972. The divers also recorded depth, substrate description, underwater visibility and, in most cases, the surface and bottom temperature.

Red algae species composition and abundance was obtained at some stations by removing all red algae within a randomly placed ¼ m^2 (2.7 ft^2) metal frame; the methods of processing the red algae samples are discussed in the section on intertidal surveys.

All fish observed within the survey area were recorded and estimates were made of their numbers.

Pre-survey (September 1971)

The pre-survey gave us the opportunity to learn about the area; test our sampling methods; and, most importantly, learn the flora and fauna that we would be quantifying during future surveys. Many species were observed but not recorded by the divers, or if recorded, not quantified.

We occupied 12 random stations and one reconnaissance station during

the pre-survey. All stations were in the Central Area; depths ranged from 4.6 m-22.0 m (15.2-17.6 ft) and underwater visibility ranged from 3.0 m-9.2 m (9.9-30.4 ft).

Algae

Laminaria setchellii was the most frequently observed brown alga and also the most numerous of the six species observed (Table 1). Bull kelp, *Nereocystis luetkeana*, was observed at about one-third of the stations, and *Desmarestia munda* was present at 15% of the stations.

Porifera

Sponges were recorded at only two of the stations; however, divers did not consistently record this group of animals during the pre-survey.

Coelenterata

We recorded only four species during this survey period: the small red anemone, *Corynactis californica*, and hydrocoral, *Allopora porphyra*, were the most abundant forms though each was recorded only once.

Mollusca

Of the 11 species recorded, only 5 were quantified (Table 2). Top shells, *Calliostoma* spp. and turban snails, *Tegula brunnea*, were the most frequently observed on the non-quantified molluscs. Red abalone, *Haliotis rufescens*, averaging 12.67 per station, were the most abundant of the molluscs counted by the divers, and were present at 53.8% of the stations, but were not present at stations deeper than 13.6 m (45 ft). Pino abalone, *Haliotis kamtschatkana*, were observed at 61.5% of the stations and flat abalone at over 20% of the stations. The large chiton, *Cryptochiton stelleri*, was second in abundance averaging 2.46 per station.

Echinodermata

We quantified 12 of the 15 (plus several unidentified) species observed. The giant red sea urchin, *Strongylocentrotus franciscanus*, was

TABLE 1. Sum and Percent Frequency of Occurrence at Subtidal Stations of Six Species of Brown Algae - Central Area - Mendocino Power Plant Site - September 1971 (Pre-survey).

	Sum	Percent freq.	Mean
Cystoseira osmundacea	(1)*	8.3	-
Desmarestia munda	(2)*	16.7	-
Egregia menziesii	2	8.3	0.17
Laminaria setchellii	5365 (1)*	58.3	487.73
Nereocystis luetkeana	33 (2)*	33.3	3.30
Pterygophora californica	6	8.3	0.50

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 2. Sum and Percent Frequency of Occurrence at Subtidal Stations of 17 Species of Invertebrates - Central Area - Mendocino Power Plant Site - September 1971 (Pre-survey).

	Sum	Percent freq.	Mean
MOLLUSCA			
Cryptochiton stelleri	32	38.5	2.46
Haliotis kamtschatkana	16 (1)*	61.5	1.33
Haliotis rufescens	152 (1)*	53.8	12.67
Haliotis wallalensis	4	23.1	0.31
Hinnites multirugosus	1	7.7	0.08
ECHINODERMATA			
Cucumaria miniata	2 (1)*	23.1	0.17
Dermasterias imbricata	12 (1)*	38.5	1.00
Henricia leviuscula	53 (1)*	69.2	4.42
Orthasterias koehleri	1	7.7	0.08
Pisaster brevispinus	29 (1)*	53.8	2.42
Pisaster giganteus	5	30.8	0.38
Pisaster ochraceous	13	23.1	1.00
Pycnopodia helianthoides	4 (1)*	69.2	3.42
Solaster dawsoni	1	7.7	0.08
Solaster stimpsoni	3 (1)*	23.1	0.25
Solaster spp.	22	23.1	1.69
Strongylocentrotus franciscanus	174 (1)*	92.3	145.08
Strongylocentrotus purpuratus	196	15.4	15.08
TOTAL STATIONS	13		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

the most numerous, with a mean per station of 145.08, as well as the most frequently observed echinoderm, appearing at 92.3% of the stations. In fact, these urchins were the most numerous of all macroinvertebrates quantified. The purple sea urchin, *S. purpuratus*, and starfish, *Henricia leviuscula*, were second and third in echinoderm abundance respectively.

Results

Red Algae

Less emphasis was placed on sampling subtidal red algae and although the resultant data are not statistically significant, we feel that the 17 stations sampled reveal the dominant forms (Tables 3 and 4) and depict the generalized patterns of species stratification by depth (Table 5). A total of 22 genera (one unidentified), representing 29 species, was found in the samples.

By frequencies of occurrence and abundance, there are six genera of soft red algae which must be considered dominant in the subtidal: *Botryoglossum*, *Callophyllis*, *Constantinea*, *Opuntiella*, *Polyneura* and *Schizymenia*. Together these genera compose 77.1% of the sampled biomass in the Central and Control subtidal areas.

The shallowest zone, 2.4 - 7.6 m (7.9 - 25.1 ft), yielded the highest average biomass, 29.73 g/¼ m^2 (1.5 oz/ft^2), with a total of 17 algal species. The midzones, 7.9 - 15.2 m (26.1 - 50.1 ft), showed a lower average biomass, 11.25 g/¼m^2 (0.58 oz/ft^2), but had 21 species. Only one station was occupied in the deepest zone, 15.6 - 22.9 m (51.5 - 75.5 ft), and showed a biomass of 2.80 g/¼ m^2 (0.14 oz/ft^2) quadrat composed of four species.

TABLE 3. Abundance of Subtidal Red Algae in ¼m² Quadrats - Central Area - Mendocino Power Plant Site - Upwelling Period 1972.

Species	Dry weight (g/¼m²)	Percent frequency	Mean (g/¼m²)
Botryoglossum farlowianum	95.8	14.3	13.68
Botryoglossum ruprechtiana	9.5	14.3	1.36
Callophyllis crenulata	4.5	28.6	0.64
Callophyllis flabellulata	0.3	28.6	0.04
Constantinea simplex	6.7	14.3	0.96
Hymenena flabelligera	7.8	14.3	1.11
Hymenena sp.	0.06	14.3	0.01
Odanthalia washingtoniensis	1.5	28.6	0.21
Opuntiella californica	4.2	28.6	0.60
Plocamium pacificum	6.5	14.3	0.93
Polyneura latissima	3.1	42.9	0.44
Pterosiphonia dendroidea	Trace	14.3	Trace
Ptilota sp.	6.3	14.3	0.90
Rhodymenia pacifica	4.8	14.3	0.68
Schizymenia pacifica	8.5	42.9	1.21
Stenogramma californica	0.3	14.3	0.04
Unidentified	3.0	42.9	0.43
TOTALS	162.9 (8.4 oz/ft²)		23.26 (1.2 oz/ft²)
TOTAL STATIONS		7	

TABLE 4. Abundance of Subtidal Red Algae in ¼m² Quadrats - North Control Area - Mendocino Power Plant Site - Upwelling Period 1972.

Species	Dry weight (g/¼m²)	Percent frequency	Mean (g/¼m²)
Botryoglossum ruprechtiana	0.6	10.0	0.06
Botryoglossum sp.	2.4	20.0	0.24
Callophyllis crenulata	0.9	10.0	0.09
Callophyllis firma	0.6	10.0	0.06
Callophyllis flabellulata	8.5	50.0	0.85
Callophyllis sp.	3.4	30.0	0.34
Constantinea simplex	42.6	40.0	4.36
Fryeella gardneri	1.8	30.0	0.18
Halymenia coccinea	0.2	10.0	0.02
Hedophyllum sp.	0.6	10.0	0.06
Herposiphonia rigida	1.7	10.0	0.17
Hymenena flabelligera	0.6	10.0	0.06
Hymenena multiloba	0.5	10.0	0.05
Iridaea sp.	6.1	10.0	0.61
Nienburgia andersoni	3.1	10.0	0.31
Opuntiella californica	17.5	30.0	1.75
Pikea californica	0.8	10.0	0.08
Polyneura latissima	7.2	20.0	0.72
Pugetia fragilissima	4.6	30.0	0.46
Rhodymenia pacifica	15.0	10.0	1.50
Schizymenia pacifica	3.3	10.0	0.33
TOTALS	122.0 (6.3 oz/ft²)		12.2 (0.63 oz/ft²)
TOTAL STATIONS		10	

TABLE 5. Abundance of Subtidal Red Algae in ¼ m^2 Quadrats by 7.6 m Depth Intervals - Mendocino Power Plant Site - Upwelling Period 1972.

Species	Depth (in m) 2.4 - 7.6			7.9 - 15.2			15.6 - 22.9		
	Dry wt (g/¼m^2)	Percent freq.	Mean (g/¼m^2)	Dry wt (g/¼m^2)	Percent freq.	Mean (g/¼m^2)	Dry wt (g/¼m^2)	Percent freq.	Mean (g/¼m^2)
Botryoglossum farlowianum	95.8	16.7	15.97	0	0	0	0	0	0
Botryoglossum ruprechtiana	0.6	16.7	0.10	9.5	10.0	0.95	0	0	0
Botryoglossum sp.	0.4	16.7	0.07	2.0	10.0	0.20	0	0	0
Callophyllis crenulata	3.5	16.7	0.58	1.9	20.0	0.19	0	0	0
Callophyllis firma	0	0	0	0.6	10.0	0.06	0	0	0
Callophyllis flabellulata	0	0	0	8.5	60.0	0.85	0.3	100.0	0.3
Callophyllis sp.	2.2	33.3	0.37	1.2	10.0	0.12	0	0	0
Constantinea simplex	38.0	50.0	6.33	11.3	20.0	1.13	0	0	0
Fryeela gardneri	0	0	0	1.6	20.0	0.16	0.2	100.0	0.2
Halymenia coccinea	0	0	0	0.2	10.0	0.02	0	0	0
Hedophyllum sp.	0.6	16.7	0.10	0	0	0	0	0	0
Herposiphonia rigida	0	0	0	1.7	10.0	0.17	0	0	0
Hymenena flabelligera	0	0	0	1.7	10.0	0.17	0	0	0
Hymenena multiloba	0	0	0	0.5	10.0	0.05	0	0	0
Hymenena sp.	0	0	0	0.1	10.0	0.01	0	0	0

TABLE 5. (cont.)

	Depth (in m) 2.4 - 7.6			7.9 - 15.2			15.6 - 22.9		
	Dry wt ($g/\frac{1}{4}m^2$)	Percent freq.	Mean ($g/\frac{1}{4}m^2$)	Dry wt ($g/\frac{1}{4}m^2$)	Percent freq.	Mean ($g/\frac{1}{4}m^2$)	Dry wt ($g/\frac{1}{4}m^2$)	Percent freq.	Mean ($g/\frac{1}{4}m^2$)
Iridea sp.	6.1	16.7	1.02	0	0	0	0	0	0
Nienburgia Andersoniana	3.1	16.7	0.52	0	0	0	0	0	0
Odanthalia washingtoniensis	1.0	16.7	0.17	0.5	10.0	0.05	0	0	0
Opuntiella californica	0	0	0	21.7	50.0	2.17	0	0	0
Pikea californica	0.8	16.7	0.13	0	0	0	0	0	0
Plocamium pacificum	6.5	16.7	1.08	0	0	0	0	0	0
Polyneura latissima	0	0	0	9.7	40.0	0.97	0.6	100.0	0.6
Pterosiphonia dendroidea	Trace	16.7	Trace	0	0	0	0	0	0
Ptilota sp.	6.3	16.7	1.05	0	0	0	0	0	0
Pugetia fragilissima	0	0	0	2.9	20.0	0.29	1.7	100.0	1.7
Rhodymenia pacifica	4.8	16.7	0.80	15.0	10.0	1.50	0	0	0
Schizymenia pacifica	6.7	33.3	1.12	5.1	20.0	0.51	0	0	0
Stenogramma californica	0	0	0	0.3	10.0	0.03	0	0	0
Unidentified	2.0	16.7	0.33	0.1	20.0	0.01	0	0	0
TOTALS	178.4 (9.2 oz/ft^2)		29.73 (1.5 oz/ft^2)	102.8 (5.2 oz/ft^2)		11.25 (5.3 oz/ft^2)	2.8 (0.14 oz/ft^2)		2.80 (0.14 oz/ft^2)
NUMBER OF STATIONS		6			10			1	

Large Brown Algae

Five species of large brown algae observed in the subtidal transects from January through September, 1972 were quantified. These algae provide the basis of support for the two major herbivores of the subtidal, *Strongylocentrotus franciscanus* and *Haliotis rufescens*. The data for the algae is presented in terms of total abundance during the sampling program (Table 6), abundance by oceanographic period (Table 7), and abundance by depth (Table 8).

Numerically the most abundant algae was *Desmarestia munda* which occurred with a mean of 63.32 plants/30 m^2 (327 ft^2) station. This species was abundant in the 2.4 - 7.6 m (7.9 - 25.1 ft) and 7.9 - 15.2 m (26.1 - 50.1 ft) depths, but disappeared below the 15.2 m (50.1 ft) mark. *D. munda* also expressed a marked seasonality during the oceanographic periods. It was not observed in the Davidson Period (November-March), reached peak numbers in the Upwelling Period (April-August), and appeared to begin a decline during the Oceanic Period (September-October). *Laminaria setchellii* was the next most common algae with 29.46 plants per 30 m^2 (327 ft^2) station. It was also the most consistent species, showing no significant variation of its means from oceanographic period to another. *L. setchellii* was also the only brown algae observed in all three depth zones. A form closely related to *L. setchellii*, *Pterygophora californica*, was third in overall abundance with 6.82 plants per 30 m^2 (327 ft^2) station, but showed unexpected seasonal variation, possibly associated with vagaries of spatial variation and low sample size in the Davidson and Oceanic Periods. The next most common form was bull kelp, *Nereocystis luetkeana*, whose well-documented annual life cycle was reflected in our data. However, *N. luetkeans*, unlike

TABLE 6. Comparison of Mean Number/30 m^2 Subtidal Station and Percent Frequency of Occurrence of Five Species of Brown Algae - Mendocino Power Plant Site - January through September 1972.

	Central Area			North Control Area			Totals		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cystoseira osmundacea	18	14.8	0.67	35	16.7	1.46	53	15.7	1.04
Desmarestia munda	2527 (1)*	33.3	97.19	576 (1)*	50.0	25.04	3103 (2)*	41.2	63.32
Laminaria setchellii	755 (1)*	55.6	29.04	718	79.2	29.92	1473 (1)*	66.7	29.46
Nereocystis luetkeana	267	29.6	9.89	10	16.7	0.42	277	23.5	5.43
Pterygophera californica	169	37.0	6.26	179	41.7	7.46	348	39.2	6.82
TOTAL STATIONS	27			24			51		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 7. Comparison of Mean Number Per 30 m^2 Subtidal Station and Percent Frequency of Occurrence by Oceanographic Period of Five Species of Brown Algae - Mendocino Power Plant Site - January through September 1972.

	Davidson			Upwelling			Oceanic		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cystoseira osmundacea	18	25.0	2.25	35	14.6	0.85	0	0.0	0.00
Desmarestia munda	0	0.0	0.00	2993 (2)*	48.8	76.74	110	50.0	55.0
Laminaria setchellii	222	50.0	27.75	1187 (1)*	70.7	29.68	64	100.0	32.0
Nereocystis luetkeana	0	0.0	0.00	103	24.4	2.51	174	100.0	87.0
Pterygophera californica	1	12.5	0.12	309	43.9	7.54	38	50.0	19.0
TOTAL STATIONS	8			41			2		

*Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 8. Comparison of Mean Numbers Per 30 m^2 Subtidal Station and Percent Frequency of Occurrence by Depth (m) of Five Species of Brown Algae - Central and North Control Areas Combined - Mendocino Power Plant Site - January through September 1972.

Depth Range:	2.4 - 7.6			7.9 - 15.2			15.6 - 22.9		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cystoseira osmundacea	36	25.0	2.25	17	17.4	0.74	0	0.0	0.00
Desmarestia munda	640 (1)*	81.2	42.67	2463 (1)*	36.4	111.95	0	0.0	0.00
Laminaria setchellii	658 (1)*	100.0	43.87	810	73.9	35.22	5	16.7	0.42
Nereocystis luetkeana	196	31.2	12.25	81	30.4	3.52	0	0.0	0.00
Pterygophera californica	262	68.8	16.38	86	34.8	3.74	0	0.0	0.00
TOTAL STATIONS	16			23			12		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

the other four quantified species in this study does not occur ubiquitously, but in discrete "beds", and the overall mean of 5.43 plants per station does not reflect the actual densities of the kelp where it occurs. The last species considered, *Cystoseira osmundacea*, is common at shallow depths and also undergoes variation of abundance with oceanographic season.

Invertebrates

In addition to the 17 species quantified during the pre-survey, we added 18 more species of macro-invertebrates that were readily recognizable and non-cryptic. These 35 species of invertebrates represented six phyla and included all the various types of feeding behavior filter feeders, herbivores, carnivores, and omnivores. The divers also recorded the presence and subjective estimates of abundance of other invertebrates.

During 1972, we occupied 51 random stations; 8 during the Davidson Current Period, 41 during the Upwelling Period, and during the Oceanic Period. Eight reconnaissance stations were also occupied during the Oceanic Period. The early onset of southerly storms and generally severe sea conditions which prevailed during the 1972-73 winter prevented us from conducting any surveys during the Davidson Period. Underwater visibility during the 1971-72 Davidson Period ranged from 1.5 to 6.1 m (5-20 ft). and bottom temperatures, 7.8 C - 10.0 C (46 - 50 F). (Appendix II). During the Upwelling Period visibility generally increased, ranging from 1.5 to 7.6 m (5-25 ft). Bottom temperatures ranged from 7.8 C - 11.1 C (46 -52 F).

The Oceanic Period of 1972 was short-lived due to early onset of southerly storms. Visibilities were usually poor, ranging from 0.9 -

6.1 m (3-20 ft). Bottom temperatures were generally warmer ranging from 11.1 - 14.4 C (52-58 F).

Porifera

Only two of the several sponges observed and recorded have been identified: the orange finer sponge, *Haliclona* sp. and the orange puff-ball sponge, *Tethya aurantia*. When the two study areas are compared, the frequency of occurrence of both species is almost identical. The abundance of *Tethya* in both areas was about equal with a mean of 0.11 per station in the Central Area and 0.13 per station in the North Control Area (Table 9). *Haliclona* was about 2.5 times more numerous in the Central Area than in the North Control Area, and was the most abundant of the two species. The differences in means and percent frequency of occurrence for both species probably are not significant when the oceanographic periods are compared, because of the small number of stations occupied during the Davidson and Oceanic Periods (Table 10).

Some interesting trends are apparent when the numbers and frequencies of plants and animals are compared by depth. The data have been arbitrarily separated into three depth zones: shallow = 2.4 - 7.6 m (8-25 ft), mid-range = 7.9 - 15.2 (26-50 ft), deep = 15.6 - 22. 9 m (51-75 ft). In the Central and North Control Areas respectively, there were 7 and 9 shallow stations, 12 and 11 mid-range stations and 8 and 4 deep stations (Appendices III-VI). Both species of sponges increased in abundance and frequency of occurrence with increase in depth (Table 11).

Coelenterata

Three species of sea anemones were quantified (*Tealia* spp. includes both species). *Tealia lofotensis* was the most frequently observed

TABLE 9. Comparison of Mean Number Per Subtidal Station and Percent Frequency of Occurrence of Eight Species of Invertebrates - Central and North Control Areas - Mendocino Power Plant Site - January through September 1972.

	Central Area			North Control Area			Totals		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
PORIFERA									
Haliclona sp.	14	11.1	0.52	4	8.3	0.17	18	9.8	0.35
Tethya aurantia	3	11.1	0.11	3 (1)*	12.5	0.13	6 (1)*	11.8	0.12
COELENTERATA									
Anthopleura artemesia	39 (1)*	25.9	1.50	10 (1)*	12.5	0.42	49 (2)*	19.6	1.00
Tealia crassicornis	8	22.2	0.30	5	16.7	0.21	13	19.6	0.25
Tealia lofotensis	12	22.2	0.44	11	25.0	0.46	23	23.5	0.45
Tealia spp.	12	18.5	0.44	5	12.5	0.21	17	15.7	0.33
ARTHROPODA									
Loxorhynchus crispatus	7	18.5	0.26	15	33.3	0.62	22	25.5	0.43
CHORDATA									
Styela montereyensis	17 (1)*	25.9	0.65	16	33.3	0.67	33 (1)*	29.4	0.66
TOTAL STATIONS	27			24			51		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 10. Comparison of Mean Number Per Subtidal Stations and Percent Frequency of Occurrence by Oceanographic Period of Eight Species of Invertebrates - Mendocino Power Plant Site - January through September 1972.

	Davidson			Upwelling			Oceanic		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
PORIFERA									
Haliclona sp.	1	12.5	0.12	17	9.8	0.41	0	0.0	0.00
Tethya aurantia	2 (1)*	37.5	0.28	4	7.3	0.10	0	0.0	0.00
COELENTERATA									
Anthopleura artemesia	15	12.5	1.88	34 (1)*	19.5	0.85	0 (1)*	50.0	0.00
Tealia crassicornis	0	0.0	0.00	13	26.8	0.32	0	0.0	0.00
Tealia lofotensis	0	0.0	0.00	23	29.3	0.56	0	0.0	0.00
Tealia spp.	13	75.0	1.62	4	4.9	0.10	0	0.0	0.00
ARTHROPODA									
Loxorhynchus crispatus	2	12.5	0.25	20	29.3	0.49	0	0.0	0.00
CHORDATA									
Stylea montereyensis	0	0.0	0.00	33 (1)*	36.6	0.82	0	0.0	0.00
TOTAL STATIONS	8			41			2		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

anemone in the North Control Area, while *Anthopleura artemesia* was the most frequently observed and most numerous anemone in the Central Area. All three anemones increased in abundance with increasing depth (Table 11).

Mollusca

The red abalone was the most abundant of the 13 species quantified in both the Central and North Control Areas, but ranked only fourth in the overall abundance (Table 12). Next in abundance were the gumboot chiton, *Cryptochiton stelleri*; the three-wing murex, *Ceratostoma foliatum*; the spindle shell, *Fusinus harfordi*; and a nudibranch, *Cadlina luteomarginata*. The mean counts per station for some of the animals were very similar for both areas. The largest differences were reflected by the nudibranchs, *Anisodoris nobilis*, *Dendrodoris fulva* and *Austrodoris odhneri*; the gumboot chiton, *Cryptochiton stelleri*; the keyhole limpet, *Diodora aspera*; *Fusinus harfordi*, and rock scallops, *Hinnites multirugosus*. Most of the differences recorded during the three different oceanographic periods probably are due to differences in sample size (Table 13).

The comparison of mean numbers per station by the three different depth groups has produced some interesting trends. Numbers of *Austrodoris*, *Cadlina*, *Dendrodoris*, *Ceratostoma*, *Diodora*, *Haliotis kamtschatkana*, and *Hinnites* increased with depth (Table 14).

Abalone were measured whenever possible; flat abalone ranged from 55 - 115 mm (2.2-4.6 inches) in length; pinto abalone ranged from 30 - 115 mm (1.2-4.6 inches) and red abalone ranged from 50 - 225 mm (2.0-9.0 inches) (Figure 3).

Arthropoda

Loxorhynchus crispatus, the masking crab, was the only quantifiable animal within this phylum. The other crabs and shrimp were either too cryptic or too small to quantify. The lack of large *Cancer* crabs, par-

TABLE 11. Comparison of Mean Numbers Per Subtidal Station and Percent Frequency of Occurrence by Depth of Eight Species of Invertebrates - Mendocino Power Plant Site - January through September 1972.

Depth Range:	2.4-7.6 m			7.9-15.2 m			15.6-22.9 m		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
PORIFERA									
Haliclona sp.	0	0.0	0.00	4	8.7	0.17	14	25.0	1.17
Tethya aurantia	1	6.2	0.06	2 (1)*	13.0	0.09	3	16.7	0.25
COELENTERATA									
Anthopleura artemesia	4	12.5	0.25	17 (2)*	21.7	0.81	28	25.0	2.33
Tealia crassicornis	2	12.5	0.12	7	26.1	0.30	4	16.7	0.33
Tealia lofotensis	6	31.2	0.38	6	13.0	0.26	11	33.3	0.92
Tealia spp.	4	12.5	0.25	10	17.4	0.43	3	16.7	0.25
ARTHROPODA									
Loxorhynchus crispatus	2	12.5	0.12	16	34.8	0.70	4	25.0	0.33
CHORDATA									
Styela montereyensis	22	43.8	1.38	9 (1)*	30.4	0.41	2	8.3	0.17
TOTAL STATIONS	16			23			12		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 12. Comparison of Mean Number Per Subtidal Station and Percent Frequency of Occurrence of 13 Species Molluscs - Central and North Control Areas - Mendocino Power Plant Site - January through September 1972.

	Central Area			North Control Area			Totals		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Anisodoris nobilis	17	29.6	0.63	8 (1)*	25.0	0.35	25 (1)*	27.4	0.50
Archidoris montereyensis	4	7.4	0.15	5 (1)*	20.8	0.22	9 (1)*	13.7	0.18
Austrodoris odhneri	2	7.4	0.07	11	12.5	0.46	13	9.8	0.25
Cadlina luteomarginata	48	55.6	2.18	43 (1)*	50.0	2.26	91 (1)*	52.9	2.22
Ceratostoma foliatum	82 (1)*	55.6	3.15	57 (4)*	66.7	2.85	139 (5)*	60.8	3.02
Cryptochiton stelleri	64	59.2	2.37	117	75.0	4.88	181	66.7	3.55
Dendrodoris fulva	13	18.5	0.48	21	41.7	0.88	34	29.4	0.67
Diodora aspera	36	48.1	1.33	15	29.2	0.62	51	37.2	1.00
Fusinus harfordi	30	25.9	1.11	69 (2)*	41.7	3.14	99 (2)*	33.3	2.02
Haliotis kamtschatkana	29	44.4	1.07	32	37.5	1.33	61	41.2	1.20
H. rufescens	138	48.1	5.11	132	58.3	5.50	270	52.9	5.29
H. wallalensis	4	14.8	0.15	5	16.7	0.21	9	15.7	0.18
Hinnites multirugosus	2	7.4	0.07	17	37.5	0.71	19	21.6	0.37
TOTAL STATIONS	27			24			51		

*Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 13. Comparison of Mean Number Per Subtidal Stations and Percent Frequency of Occurrence by Oceanographic Period of 13 Species of Molluscs - Mendocino Power Plant Site - January through September 1972.

	Davidson			Upwelling			Oceanic		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Anisodoris nobilis	0	0.0	0.00	25 (1)*	34.1	0.62	0	0.0	0.00
Archidoris montereyensis	0	0.0	0.00	9 (1)*	17.1	0.22	0	0.0	0.00
Austrodoris odhneri	0	0.0	0.00	13	12.2	0.32	0	0.0	0.00
Cadlina luteomarginata	0	0.0	0.00	88 (1)*	63.4	2.20	3	50.0	1.50
Ceratostoma foliatum	16 (1)*	50.0	2.28	118 (4)*	61.0	3.19	5	100.0	2.50
Cryptochiton stelleri	20	62.5	2.50	160	68.3	3.90	1	50.0	0.50
Dendrodoris fulva	0	0.0	0.00	34	36.6	0.83	0	0.0	0.00
Diodora aspera	6	37.5	0.75	44	39.0	1.07	1	50.0	0.50
Fusinus harfordi	3 (2)*	37.5	0.50	94	29.3	2.29	2	100.0	1.00
Haliotis kamtschatkana	10	62.5	1.25	50	36.6	1.22	1	50.0	0.50
H. rufescens	38	37.5	4.75	228	53.6	5.56	4	100.0	2.00
H. wallalensis	1	12.5	0.12	8	17.1	0.20	0	0.0	0.00
Hinnites multirugosus	1	12.5	0.12	18	24.4	0.44	0	0.0	0.00
TOTAL STATIONS	8			41			2		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

TABLE 14. Comparison of Mean Numbers Per Subtidal Station and Percent Frequency of Occurrence by Depth of 13 Species of Molluscs - Mendocino Power Plant Site - January Through September 1972

Depth Range:	2.4-7.6 m			7.9-15.2 m			15.6-22.9 m		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Anisodoris nobilis	10	31.2	0.62	7 (1)*	21.7	0.32	8	33.3	0.67
Archidoris montereyensis	5	18.8	0.31	1 (1)*	8.7	0.04	3	16.7	0.25
Austrodoris odhneri	0	0.0	0.00	8	8.7	0.35	5	25.0	0.42
Cadlina luteomarginata	13	43.8	0.93	43 (1)*	52.2	2.53	35	66.7	3.50
Ceratostoma foliatum	25 (1)*	56.2	1.67	65 (2)*	52.2	3.25	49 (1)*	75.0	4.45
Cryptochiton stelleri	107	93.8	6.69	58	60.9	2.52	16	33.3	1.33
Dendrodoris fulva	10	43.8	0.62	12	17.4	0.52	12	33.3	1.00
Diodora aspera	6	18.8	0.38	25	39.1	1.09	20	66.7	1.67
Fusinus harfordi	10	18.8	0.62	74 (2)*	47.8	3.52	15	25.0	1.25
Haliotis kamtschatkana	1	6.2	0.06	33	43.5	1.43	27	75.0	2.25
H. rufescens	163	87.5	10.19	107	56.5	4.65	0	0.0	0.00
H. wallalensis	3	18.8	0.19	6	21.7	0.62	0	0.0	0.00
Hinnites multirugosus	6	18.8	0.38	7	21.7	0.30	6	25.0	0.50
TOTAL STATIONS	16			23			12		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

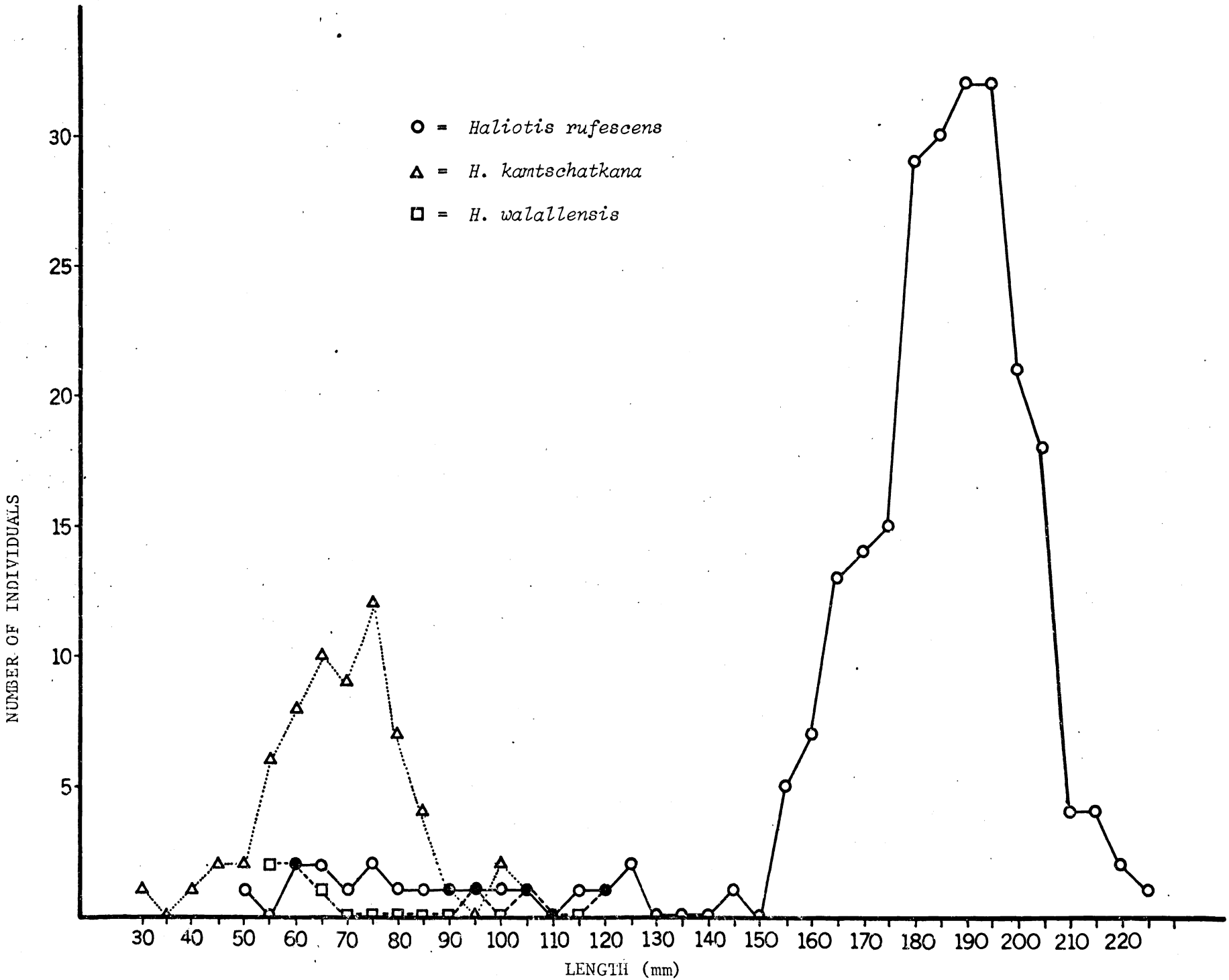

FIGURE 3. Length Frequencies of Abalone Sampled from Subtidal Stations - Mendocino Power Plant Site - 1972.

ticularly *C. antennarius* and *C. productus*, in the subtidal was completely unexpected. Masking crabs were about twice as numerous in the North Control Area as in the Central Area (Table 9). Overall, they were more numerous in the mid-range depths of 7.9 - 15.2 m (26.1-50.1 ft) than at shallow or deep stations (Table 11).

Echinodermata

The giant red sea urchin not only was the most numerous of the 14 echinoderms quantified, they were also the most numerous of all animals quantified (Table 15). They were present at nearly every station and the mean counts per station were surprisingly close for the Central and North Control Areas. In fact, there was good agreement between the two study areas for most of the echinoderms; exceptions were the mean-per-station for *Eupentacta quinquesemata*, *Pisaster brevispinus* and purple sea urchins, *S. purpuratus*. The small red sea star, *Henricia leviuscula*, was the most frequently observed echinoderm and ranked third in abundance. Differences in abundance and frequency of occurrence encountered in the comparison between oceanographic periods again are probably due to differences in sample size (Table 16).

Giant red sea urchins were well distributed throughout the depth ranges, but were most dense at mid-depths (Table 17). Purple sea urchins were most dense at shallow stations and none were observed deeper than 12.2 m (40 ft). (Appendix III-VI). *Henricia* increased in abundance with increase in depth; this was also true for *Dermasterias*, *Orthasterias*, *Pisaster brevispinus*, and *Solaster stimpsoni*. Echinoderms that decreased in abundance with depth included *Cucumaria*, *Eupentacta*, and *Pycnopodia*.

Chordata

(Subphylum Tunicata) The solitary tunicate, *Styela montereyensis*, was the only member of this group quantified. The density and fre-

TABLE 15. Comparison of Mean Number Per Subtidal Station and Percent Frequency of Occurrence of 14 Species of Echinoderms - Central and North Control Areas - Mendocino Power Plant Site - January through September 1972.

	Central Area			North Control Area			Totals		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cucumaria miniata	41	37.0	1.52	27	54.2	1.12	68	45.1	1.33
Dermasterias imbricata	25	48.1	0.92	19	45.8	0.79	44	47.0	0.86
Eupentacta quinquesemita	38	48.1	1.41	233	50.0	9.71	271	49.0	5.31
Henricia leviuscula	157	85.2	5.81	144	87.5	6.26	301	86.3	5.90
Orthasterias koehleri	10	33.3	0.37	5	16.7	0.21	15	25.5	0.29
Pisaster brevispinus	53	63.0	1.96	10	29.2	0.42	63	47.0	1.24
Pisaster giganteus	4	14.8	0.15	7	16.7	0.29	11	15.7	0.22
Pisaster ochraceous	16	29.6	0.59	6	20.8	0.25	22	25.5	0.43
Pycnopodia helianthoides	25	40.7	0.92	21	41.7	0.88	46	41.2	0.90
Solaster dawsoni	5	18.5	0.18	3	8.3	0.12	8	13.7	0.16
Solaster stimpsoni	8	25.9	0.30	5	16.7	0.21	13	21.6	0.25
Stichopus californicus	1	3.7	0.04	1	4.2	0.04	2	3.9	0.04
Strongylocentrotus franciscanus	1480	77.8	54.81	1282	91.7	53.42	2762	84.3	54.16
Strongylocentrotus purpuratus	91	11.1	3.37	305	37.5	12.7	396	23.5	7.76
TOTAL STATIONS	27			24			51		

TABLE 16. Comparison of Mean Number Per Subtidal Stations and Frequency of Occurrence by Oceanographic Period of 14 Species of Echinoderms - Mendocino Power Plant Site - January through September 1972.

	Davidson			Upwelling			Oceanic		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cucumaria miniata	0	0.0	0.00	68	56.1	1.66	0	0.0	0.00
Dermasterias imbricata	10	50.0	1.25	34	48.8	0.83	0	0.0	0.00
Eupentacta quinquesemita	0	0.0	0.00	269	56.1	6.56	2	100.0	1.00
Henricia leviuscula	42	75.0	5.25	257	87.8	6.27	2	100.0	1.00
Orthasterias koehleri	4	37.5	0.50	10	22.0	0.24	1	50.0	0.50
Pisaster brevispinus	12	50.0	1.50	41	43.9	1.00	10	100.0	5.00
Pisaster giganteus	2	12.5	0.25	8	14.6	0.20	1	50.0	0.50
Pisaster ochraceous	1	12.5	0.12	21	29.3	0.51	0	0.0	0.00
Pycnopodia helianthoides	3	25.0	0.38	41	43.9	1.00	2	50.0	1.00
Solaster dawsoni	4	37.5	0.50	2	4.9	0.05	2	100.0	1.00
Solaster stimpsoni	3	25.0	0.38	8	17.1	0.20	2	100.0	1.00
Stichopus californicus	0	0.0	0.00	2	4.9	0.05	0	0.0	0.00
Strongylocentrotus franciscanus	360	75.0	45.00	2116	85.4	51.61	286	100.0	143.00
Strongylocentrotus purpuratus	3	25.0	0.38	393	24.4	9.58	0	0.0	0.00
TOTAL STATIONS	8			41			2		

TABLE 17. Comparison of Mean Numbers Per Subtidal Station and Percent Frequency of Occurrence by Depth of 14 Species of Echinoderms - Mendocino Power Plant Site - January through September 1972.

Depth Range:	2.4-7.6 m			7.9-15.2 m			15.6-22.9 m		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Cucumaria miniata	25	56.2	1.56	31	34.8	1.35	12	50.0	1.00
Dermasterias imbricata	2	12.5	0.12	27	56.5	1.17	15	75.0	1.25
Eupentacta quinquesemita	131	68.8	8.19	111	34.8	4.83	29	50.0	2.42
Henricia leviuscula	60	75.0	3.75	129	73.9	5.61	112	100.0	9.33
Orthasterias koehleri	1	6.2	0.06	5	17.4	0.22	9	58.3	0.75
Pisaster brevispinus	14	31.2	0.88	18	43.5	0.78	31	75.0	2.58
Pisaster giganteus	4	12.5	0.25	4	13.0	0.17	3	25.0	0.25
Pisaster ochraceous	4	18.8	0.25	15	0.35	0.65	3	16.7	0.25
Pycnopodia helianthoides	22	56.2	1.38	21	39.1	0.91	3	16.7	0.25
Solaster dawsoni	1	6.2	0.06	5	17.4	0.22	2	16.7	0.17
Solaster stimpsoni	2	12.5	0.12	6	21.7	0.26	5	33.3	0.42
Stichopus californicus	0	0.0	0.00	1	4.3	0.04	1	8.3	0.08
Strongylocentrotus franciscanus	857	81.2	53.56	1529	78.3	66.48	376	100.0	31.3
Strongylocentrotus purpuratus	381	50.0	23.81	15	17.4	0.65	0	0.0	0.00
TOTAL STATIONS	16			23			12		

TABLE 18. Numbers and Percent Frequency of Occurrence of Five Species of Brown Algae and 24 Species of Invertebrates Recorded at Subtidal Reconnaissance Stations - Central Area - Mendocino Power Plant Site - October 1972.

	Sum	Percent freq.	Mean
ALGAE:			
Dermatestia munda	69	25.0	8.62
Laminaria setchellii	235	75.0	29.38
Nereocystis luetkeana	105	50.0	13.12
Pterygophera californica	401	62.5	50.12
INVERTEBRATES:			
PORIFERA			
Haliclona sp.	2	12.5	0.25
Tethya aurantia	6	37.5	0.75
MOLLUSCA			
Anisodoris nobilis	5	25.0	0.62
Archidoris montereyensis	6	12.5	0.75
Cadlina luteomarginata	11	50.0	1.38
Ceratostoma foliatum	14 (1)*	50.0	2.00
Cryptochiton stelleri	6	50.0	0.75
Dendrodoris fulva	3	37.5	0.38
Diaulula sandiegensis	2	12.5	0.25
Diodora aspera	14	87.5	1.75
Fusinus harfordi	17 (1)*	37.5	2.43
Haliotis kamtschatkana	10	50.0	1.25
Haliotis rufescens	55 (1)*	87.5	7.86
Hinnites multirugosus	3	12.5	0.38

TABLE 18 (cont.)

	Sum	Percent Freq.	Mean
ECHINODERMATA			
Dermasterias imbricata	3	12.5	0.38
Henricia leviuscula	44	87.5	5.50
Orthasterias koehleri	1	12.5	0.12
Pisaster brevispinus	59 (1)*	87.5	8.43
Pisaster giganteus	2	25.0	0.25
Pycnopodia helianthoides	13	62.5	1.62
Solaster dawsoni	3	25.0	0.38
Solaster stimpsoni	4	37.5	0.50
Strongylocentrotus franciscanus	671 (1)*	87.5	95.86
CHORDATA			
Styela montereyensis	10	37.5	1.25
TOTAL STATIONS	8		

* Number of stations where organism was observed but not counted; stations not included in calculating mean.

quency of occurrence of *Styela* was about the same in the Central and North Control Areas (Table 9). They were most abundant at the shallow water stations (Table 11).

During October 1972, we occupied eight reconnaissance stations within Arena Cove in order to obtain a better understanding of the animal and plant communities in this more protected environment. Stations were purposely selected in kelp beds and in areas where there was no observable surface canopy of kelp; this accounts for the complete absence of bull kelp, *Nereocystis luetkeana*, at three of the stations (Table 18 and Appendix VI). The most important observation is the correspondingly high abundance of red abalone and kelp at Station 148 and the total absence of red abalone and low abundance of kelp at Station 272.

Otherwise, the observed structure of the invertebrate community did not change drastically in the reconnaissance stations from the observations made previously about general abundance and depth distribution of species from the randomly selected subtidal stations. Giant red sea urchins were very common; the stations were too deep for purple sea urchins to be encountered. The fairly abundant deeper occurring species, such as *Pisaster brevispinus* and *Henricia*, were common, and red abalone were abundant at the shallower stations.

Confidence Intervals

We have calculated confidence intervals for three species of brown algae and seven species of invertebrates. These plants and animals all had relatively high frequency of occurrence. The 50, 75 and 95 percent confidence intervals were calculated for the mean-per-station data for the North Control and Central Areas and the three depth zones (Tables 19 and 20).

TABLE 19. Comparison of Means Per 30 m^2 Station and Confidence Intervals of 3 Species of Brown Algae and 7 Species of Invertebrates - Central and North Control Areas - Mendocino Power Plant Site - January through September 1972.

	Central Area				North Control Area			
		Confidence Intervals (%)				Confidence Intervals (%)		
	Mean	50	70	95	Mean	50	70	95
ALGAE:								
PHAEOPHYTA								
Desmarestia munda	97.19	±56.64	±87.61	±170.59	25.043	±6.15	± 9.52	±18.61
Laminaria setchellii	29.04	± 7.56	±11.70	± 22.78	29.92	±6.74	±10.43	±20.37
Nereocystis luetkeana	9.89	± 4.45	± 6.88	± 13.38	0.42	±0.18	± 0.28	± 0.54
INVERTEBRATES:								
MOLLUSCA								
Cadlina lueteomarginata	2.18	± 0.34	± 0.53	± 1.04	2.26	±0.55	± 0.85	± 1.68
Ceratostoma folliatum	3.15	± 0.50	± 0.78	± 1.51	2.85	±0.51	± 0.79	± 1.56
Cryptochiton stelleri	2.37	± 0.49	± 0.76	± 1.47	4.88	±0.57	± 0.88	± 1.72
Haliotis rufescens	5.11	± 1.38	± 2.14	± 4.15	5.50	±1.36	± 2.10	± 4.10
ECHINODERMATA								
Dermasterias imbricata	0.92	± 0.17	± 0.26	± 0.51	0.79	±0.15	± 0.23	± 0.45
Henricia leviuscula	5.81	± 0.76	± 1.18	± 2.30	6.26	±0.93	± 1.44	± 2.82
Strongylocentrotus franciscanus	54.81	± 6.97	±10.78	± 20.95	53.42	±5.83	± 9.02	±17.61

TABLE 20. Comparison of Means Per 30 m^2 Station and Confidence Intervals by Depth of Three Species of Brown Algae and Seven Species of Invertebrates - Mendocino Power Plant Site - January through September 1972.

Depth Range	2.4-7.6 m				7.9-15.2 m				15.6-22.9 m			
		Confidence Intervals (%)				Confidence Intervals (%)				Confidence Intervals (%)		
	Mean	50	70	95	Mean	50	70	95	Mean	50	70	95
ALGAE:												
PHAEOPHYTA												
Desmarestia munda	42.67	±8.59	±13.36	±26.62	111.95	±67.12	±104.01	±203.53	0.00	--	--	--
Laminaria setchellii	43.87	±9.10	±14.15	±28.21	35.22	±8.77	±13.57	±26.53	0.42	±0.20	±0.31	±0.63
Nereocystis luetkeana	12.25	±7.28	±11.32	±22.46	3.52	±1.69	±2.61	±5.11	0.00	--	--	--
INVERTEBRATES:												
MOLLUSCA												
Cadlina luteomarginata	0.93	±0.24	±0.36	±0.73	2.53	±0.45	±0.69	±1.37	3.50	±0.93	±1.45	±2.93
Ceratostoma folliatum	1.67	±0.45	±0.70	±1.40	3.25	±0.58	±0.90	±1.78	4.45	±0.82	±1.28	±2.60
Cryptochiton stelleri	6.69	±0.70	±1.09	±2.17	2.52	±0.43	±0.67	±1.30	1.33	±0.69	±1.07	±2.17
Haliotis rufescens	10.19	±1.88	±2.92	±5.80	4.65	±1.53	±2.37	±4.63	0.00	--	--	--
ECHINODERMATA												
Dermasterias imbricata	0.12	±0.06	±0.09	±0.18	1.17	±0.20	±0.31	±0.60	1.25	±0.21	±0.33	±0.67
Henricia leviuscula	3.75	±0.96	±1.50	±2.97	5.86	±0.73	±1.14	±2.22	9.33	±1.49	±2.33	±4.72
Strongylocentrotus franciscanus	53.56	±7.70	±11.97	±23.76	66.48	±8.09	±12.52	±24.47	31.33	±3.28	±5.11	±10.34

Giant red sea urchins produced the smallest confidence intervals in both the Central and North Control Areas; 95% intervals were ±20.95 and ±17.61 for means of 54.81 and 53.42, respectively. In several cases the 95% interval was larger than the mean; this was true for *Desmaresteria* and *Nereocystis* in the Central Area, and *Nereocystis* in the North Control Area.

The 95% confidence intervals by depths also exceeded the mean-per-station for *Nereocystis* and *Dermasterias* 2.4 - 7.6 m (7.9-25.1 ft), *Desmarestia* 7.9 - 15.2 m (26.1-50.1 ft), *Nereocystis* 7.9 - 15.2 m (26.1-50.1 ft), and *Laminaria* and *Cryptochiton* 15.6 - 22.9 m (51.5-75.5 ft).

The animals that had 95% intervals of less than 50% of the mean-per-station included *Cryptochiton* and giant red sea urchins in the 2.4 - 7.6 m (7.9-25.1 ft) depth range; *Henricia* and giant red sea urchins in the 7.9 - 15.2 m (26.1-50.1 ft) range; and giant red sea urchins in the 15.6 - 22.9 m (51.5-75.5 ft) range.

Most of the 50% confidence intervals were less than 50% of the means. Some were less than 20% of the mean; in the depth comparison these included *Cryptochiton*, red abalone, and giant red sea urchins in the 2.4 - 7.6 m (7.9-25.1 ft) range; *Ceratostoma, Cryptochiton, Dermasterias, Henricia* and giant red sea urchins in the 7.9 - 15.2 m (26.1-50.1 ft) depth range; and *Dermasterias, Henricia* and giant red sea urchins in the 15.6 - 22.9 m (51.5-75.5 ft) depth range. In the Central Area 50% confidence intervals were 20% or less than the mean for *Cadlina, Ceratostoma, Henricia* and giant red sea urchins. In the North Control Area *Ceratostoma, Cryptochiton, Dermasterias, Henricia* and giant red sea urchins produced 50% confidence intervals of 20% or less of the mean-per-station.

Water Temperatures

Surface and bottom temperatures were recorded at most subtidal stations during 1972 (Figure 4). Generally, mean monthly bottom temperatures were about 0.3 C (0.5 F) lower than mean monthly surface temperature during the winter, spring and summer but with nearly identical surface temperatures during the fall when we recorded the highest temperatures. The lowest temperatures occurred during May. Generally our recorded temperatures parallel those recorded at permanent stations on the Arena Cove pier and in Loran Cove by Pacific Gas and Electric Company. The Pacific Gas and Electric Company records of mean monthly temperature were higher from May through September and lower during March.

Discussion

The red abalone probably is the most important invertebrate inhabiting the inshore Point Arena subtidal area in terms of its desirability to man as a food source. As such, our discussion will center around this large mollusc, its distribution, predators and competitors.

Red abalone have been reported from various water depths off California. In general, it is found deeper in warmer southern California waters and from the intertidal and shallow subtidal in northern California. With this in mind, one would expect more red abalone in the shallow-depth range of 2.4 - 7.6 m (7.9-25.1 ft) in our study area than in the mid-depth range. Our data supports this expectation. The mean densities in the shallow subtidal of the Central and North Control Areas were 3 to almost 10 times higher than the means recorded in the 7.9 - 15.2 m (26.1-50.1 ft) depth range (Table 21). No red abalone were observed deeper than about 13.7 m (45.2 ft). The shallow area from Inlet Cove to the Arena Cove pier supported the highest densities of the

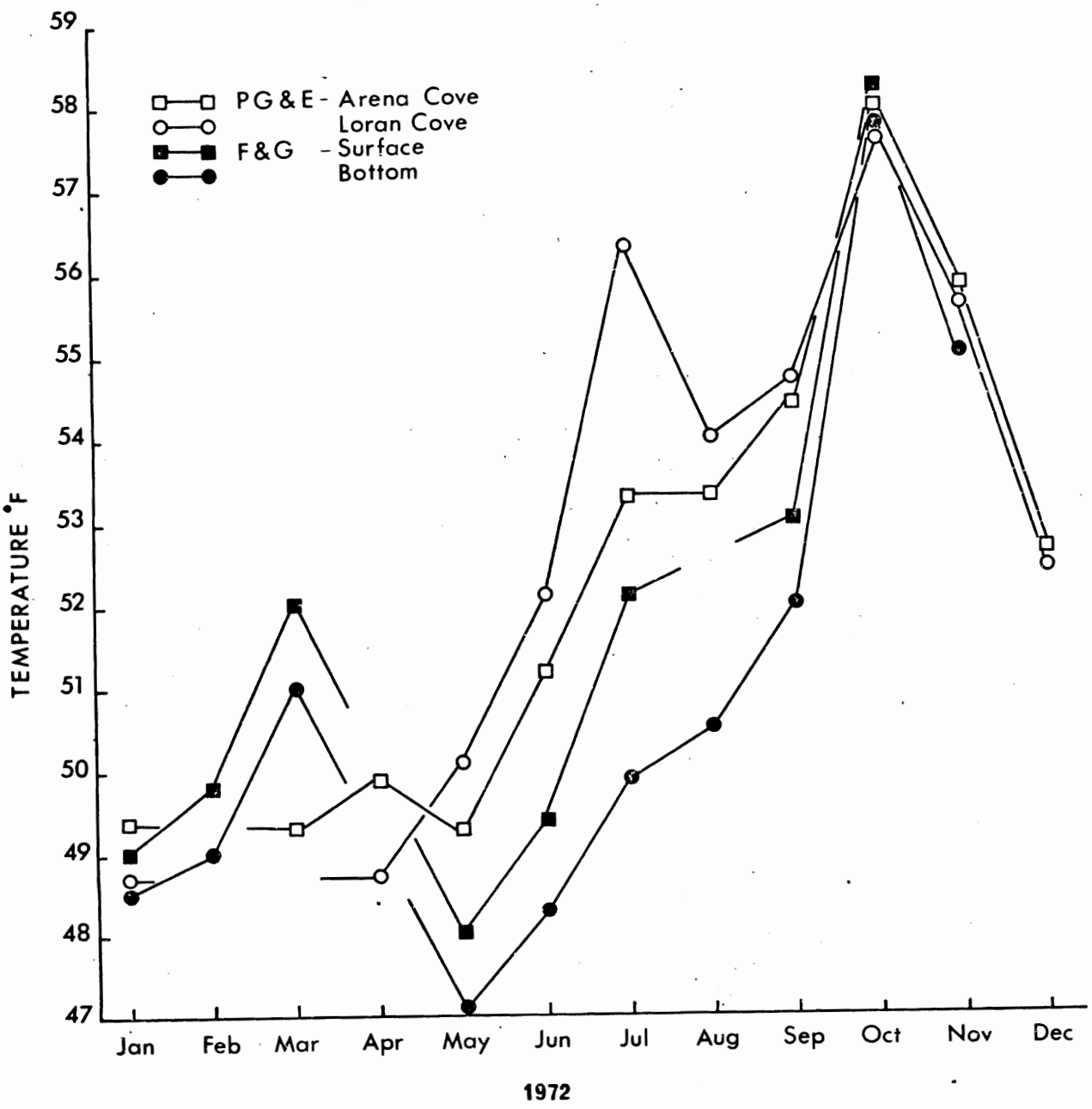

FIGURE 4. Comparison of Surface Temperatures Recorded by P.G. and E. Recording Thermometers at Loran Cove and Arena Cove Pier and Surface and Bottom Temperatures Recorded at Diving Stations - Mendocino Power Plant Site - January - December 1972.

TABLE 21. Comparison of Red Abalone, *Haliotis rufescens*, Densities by Depth and Area - Mendocino Power Plant Site - September 1971 - October 1972*

Area	2.4-7.6 m Sum	Percent freq.	Means	7.9-15.2 m Sum	Percent freq.	Means
North Control	123	90.0	11.18	9	57.1	1.28
Number of stations	11			7		
Central	226	61.11	12.56	119 (1)**	70.0	3.97
Number of stations	18			30		
Loran Station	7	100.00	7.00	37	42.8	2.64
Number of stations	1			14		
Arena Cove	219	90.0	19.91	82 (1)**	93.8	5.47
Number of stations	11			16		

* Includes pre-survey data, 30 X 2m transects adjusted to 30 m^2 arc data; and October 1972 reconnaissance stations.

** Number of stations where organisms observed but not counted, stations not included in calculating mean.

entire study area, averaging almost 20 red abalone per 30 m^2 (327 ft^2) arc. Mid-depth stations inside the cove also supported relatively large populations. We suspect that these high densities are due to two main factors; an abundance of food, and the somewhat protected environment (compared with the open coast area outside the cove). Brown algae usually considered as abalone food, *Laminaria*, *Nereocystis*, and *Pterygophera*, (Burge and Schultz 1973) were more abundant inside the cove than outside, with mean counts per station of 33.27, 12.55, 18.28, and 14.94, 1.41, 1.59 respectively (Table 22). Surface observations indicate that the largest beds of bull kelp (*Nereocystis*) are located inside of the cove.

The seas generated by winter storms create havoc both inside the cove as well as outside; however, from our data and observations we feel that the exposed outer coast receives the brunt of the wave force. There was only one station shallower than 7.6 m (25 ft) inside the cove that did not yield red abalone. This station was in an area of small cobble interspersed with several inches of silt and debris. The one shallow station outside the cove that did not contain red abalone was in the North Control Area near Sea Lion Rocks; the clean swept bottom seemed to be ideal habitat for red abalone. However, there was ample evidence that this area received strong wave action, sand scouring, and thus was unstable for abalone habitat.

We suspect that the winter storms not only cause heavy red abalone mortality during severe winters, but these storms may also serve to forcibly introduce red abalone into the intertidal areas making them available to the sportfishery.

TABLE 22. Comparison of Brown Algae Abundance - Subtidal Stations - Mendocino Power Plant Site - September 1971 through October 1972.

	North Control			Loran station to Inlet Cove			Inside cove		
	Sum	Mean	Number of stations	Sum	Mean	Number of stations*	Sum	Mean	Number of stations
Laminaria setchellii	718	29.92	24	463	14.94	31	732	33.27	22
Nereocystis luetkeana	10	0.42	24	41	1.41	29	364	12.55	29
Pterygophora californica	179	7.46	24	46	1.59	29	530	18.28	29

* Includes 60 m^2 transect data, each of these stations counted as two.

Other than man, the major red abalone predators encountered in our studies included cabezon, china rockfish, wolf-eel, *Pycnopodia helianthoides*, *Pisaster ochraceous* and *Orthasterias koehleri* (Burge and Schultz 1973). Burge and Schultz also mention the sea stars, *Pisaster giganteus*, and *P. brevispinus* as possible predators (both were quantified in our studies). As mentioned earlier, the adult rock crab, *Cancer antennarius* and adult red crab, *C. productus* were rarely encountered.

We observed only one wolf-eel during the entire study. This fish was observed on a reconnaissance dive inside the cove. Cabezon were observed throughout the area, but were most common in depths of 7.9 - 15.2 m (26.1-50.1 ft). They were present at 32.5% of the stations (Table 45). China rockfish were observed at 7.2% of the stations but were not observed at shallow stations. *Pisaster brevispinus* was the most frequently observed predatory sea star followed by *Pycnopodia* (Table 15). These two sea stars were observed at almost half of the subtidal stations. *Pisaster ochraceous* and *Orthasterias* were found at about 25% of the stations. There does not appear to be any relationship between the presence of sea stars and abalone abundance (Figure 5).

The numbers of predators in the Point Arena subtidal at present probably are not a serious factor affecting red abalone abundance; however, a significant increase in any of the predators probably would have an influence on the red abalone population size.

The giant red sea urchin is the most important competitor of the red abalone observed in our subtidal surveys in terms of food as well as space. Giant red sea urchins were present 84.3% of our random stations in 1972, with an average density of 54.16 urchins per 30 m^2 (327 ft^2) arc (Table 15).

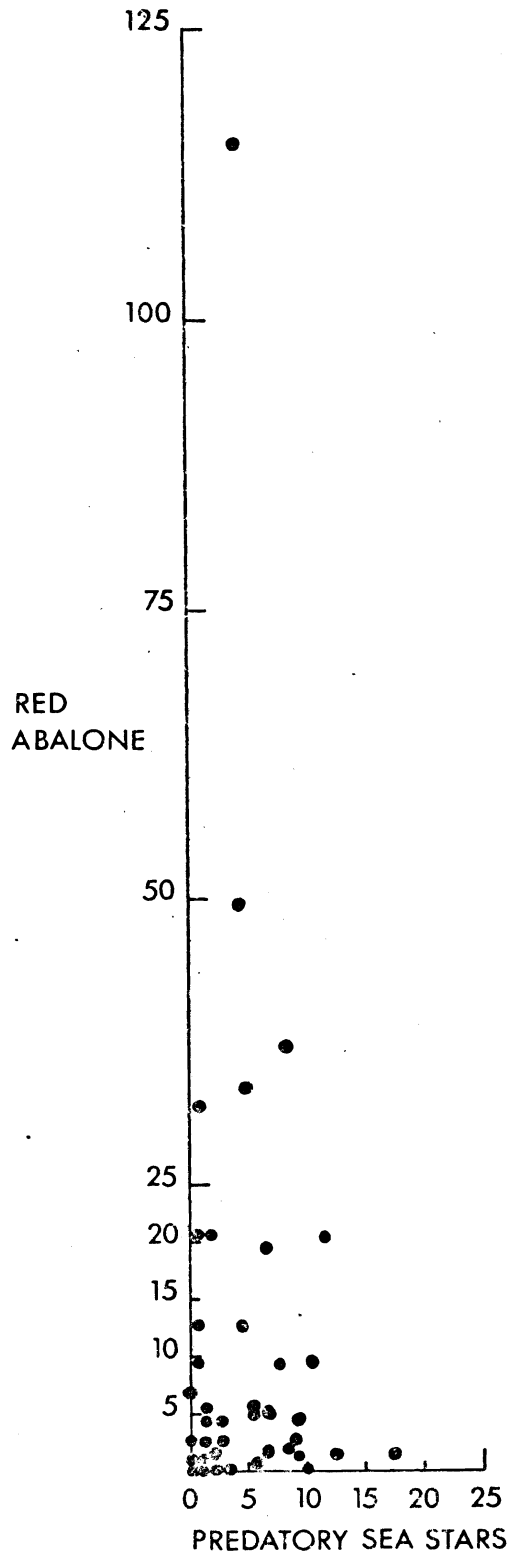

FIGURE 5. Comparison of Red Abalone and Predatory Sea Star Numbers (*Pycnopodia Pisaster ochraceous, P. brevispinus,* and *Orthasterias koehlieri*) Recorded at 30 m^2* Subtidal Stations - 2.4 to 15.2 m Depths - Mendocino Power Plant Site - September 1971 - October 1972.

* 30 X 2 m transect data converted to conform with 30 m^2 arc data.

The density was highest in depths of 7.9 - 15.2 m (26.1-50.1 ft) (Table 17). Both red abalone and giant red sea urchins were observed feeding on drift bull kelp (*Nereocystis*) in November 1972. Higher numbers of red abalone occurred at stations where giant red sea urchin numbers were less than 100 (Figure 6). When giant red sea urchin numbers were in excess of 100 per station, red abalone numbers were generally very low.

In addition to the invertebrates quantified at our subtidal and intertidal stations we made collections of small and unidentified organisms whenever they occurred for later taxonomic work. Thus far a total of 111 invertebrate species have been identified from these miscellaneous collections and observations (Appendix VII). The appendix table lists all of the plants and animals quantified, collected or observed, their common and scientific name and whether they occured subtidally, intertidally or were pelagic.

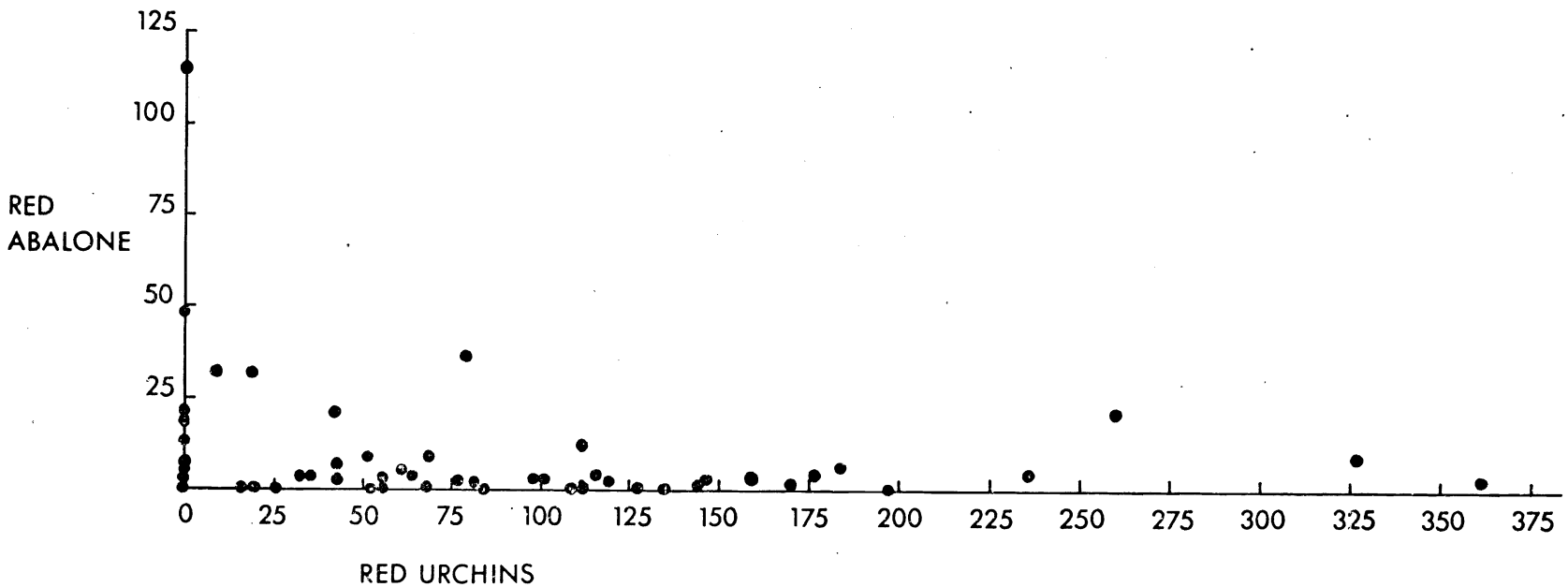

FIGURE 6. Comparison of Red Abalone and Red Urchin Numbers Recorded at 30 m^2* Subtidal Stations - 2.4 to 15.2 m Depths - Mendocino Power Plant Site - September 1971 - October 1972.

* 30 X 2 m transect data converted to conform with 30 m^2 arc data.

INTERTIDAL SURVEYS

Prepared by Laurence Laurent

Methods

Sampling in the intertidal, as in the subtidal, was conducted randomly. Two areas were studied; the proposed plant site, or "central" area, and a control area about 0.75 km (0.45 mile) north of the central area. These areas were divided into 61 m X 61 m (201 ftx201 ft) (Figure 7), and the grid stations were numbered consecutively from north to south. Before each sampling period, which corresponded to an oceanographic season, a series of station numbers were chosen from a standard table of random numbers. A grid-station which coincided with a selected number was then sampled during the period, or, if inaccessible to sampling, an alternate grid-station was visited.

The areas were sampled during periods of minus tides. A 30-m (99-ft) line marked in 1m (3.3ft) increments was placed at a subjective starting point and laid as close to the water level as sea swell and topography would permit. The level at which the line ran was usually maintained at a constant height. A $\frac{1}{4}m^2$ (2.7 ft^2) metal quadrat was placed on the substrate at four pre-selected random meter marks along the line. Within each quadrat all non-cryptic macroinvertebrates (with the notable exception of sponges, hydroids, annelids and bryozoans) larger than 10 mm (0.4 inches) and the larger brown algae were identified and counted. The soft red, green and smaller brown algae within the quadrat were scraped and collected in appropriately labeled plastic gallon jars or plastic bags. For each quadrat/station the following information was recorded on a

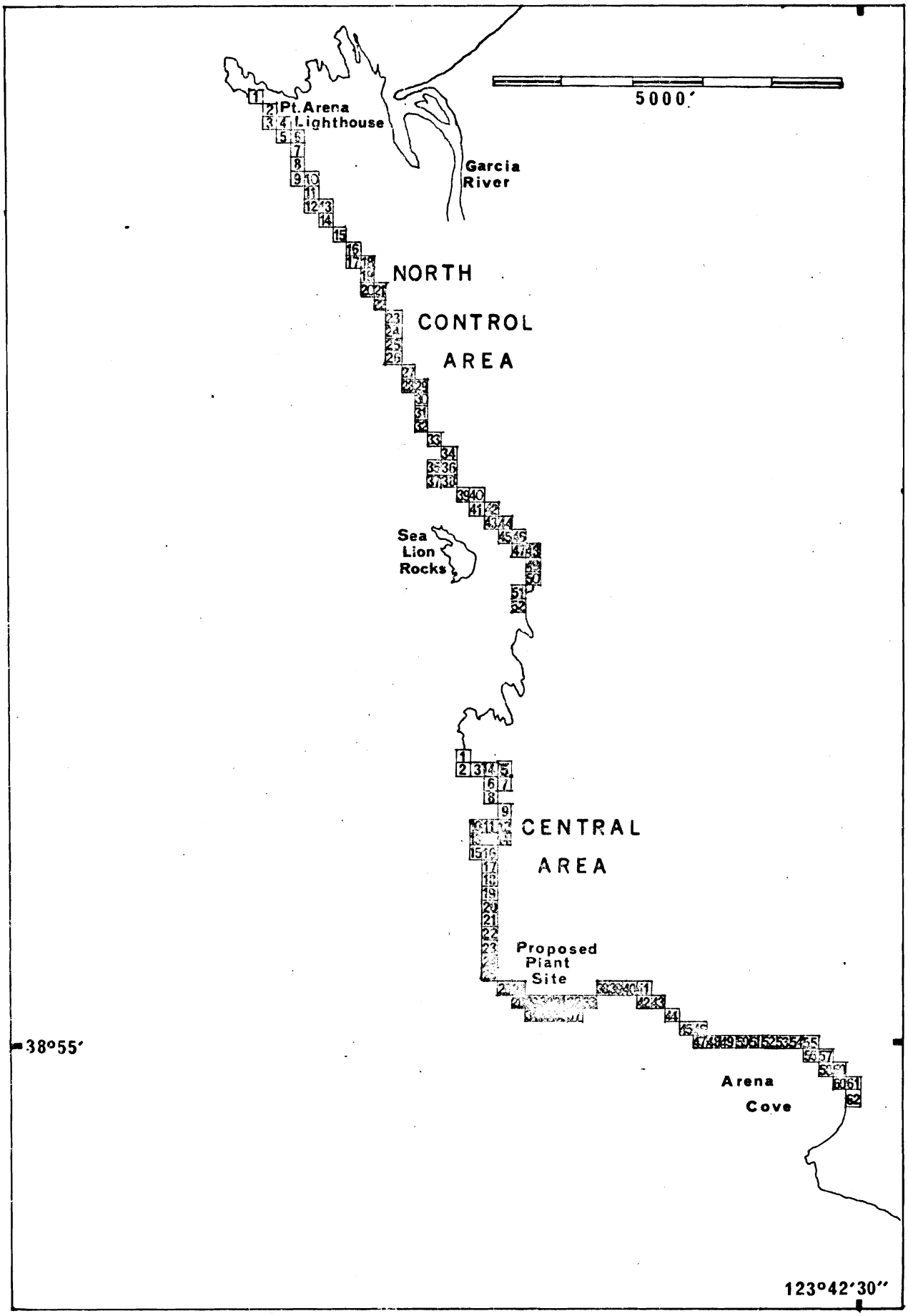

FIGURE 7. Intertidal Sampling Grid and Station Numbers - Mendocino Power Plant Site.

plastic sheet: quadrat number, time at collecting, approximate height relative to tidal level, counts of invertebrates and larger brown algal species, and an estimation of percent cover by articulated coralline algae.

The soft algae were collected to determine their specific biomass (dry weights) in the sampled areas. The algae were worked-up fresh in the laboratory, or the samples were placed in formalin and worked-up at a later time. "Work-up" entailed washing the sample in fresh water to remove associated salts and detritus, draining thoroughly, sorting to species, obtaining a wet weight, and, after a minimum period of 24 hr in a drying oven at 60 - 70 C (140-158 F), obtaining a dry weight for each species. Weights were measured on a triple beam balance to the nearest 0.1 g (0.0035 oz). This method has been used by other workers performing algae biomass studies (Doty 1969, Hansen 1972).

To facilitate later quantification of invertebrates and algae, the intertidal was divided into three semi-arbitrary vertical life zones A, B, and C, roughly corresponding to Rickett's and Calvin's (1968) life zones 2, 3, and 4. Zone A includes the intertidal from 0.9 m (3.0 ft) above mean lower low water, to approximately 1.8 m (6.0 ft), Zone B encompasses the area from 0.0-0.9 m (0.0-3.0 ft) and Zone C represents the area exposed below 0.0 m.

Results

Intertidal Invertebrates

During the study period, November, 1971 through February, 1973, a total of 262 ¼ m^2 (2.7 ft^2) quadrats were sampled; 146 in the Central Area and 116 in the Control Area. Due to the nautre of annual tidal cycle, no sampling was done during September and most of October when

the Oceanic Period occurs: therefore, all data is derived from sampling in the Davidson (early November through March) and Upwelling (April through August) periods.

Because most of the invertebrates which appeared in the quadrats are considered to be perennial, with the notable exception of the nudibranchs, there should be little discernible seasonal variation in populations throughout the sampling period. For the more common animals, this appears to be true (Tables 24 to 29). The apparent seasonal variation of the less common invertebrates may be a function of sampling design and/or sample size. For example, the sun star, *Pycnopodia helianthoides*, an important predator, appeared only twice in the study period; the reason for this is probably due to the fact that *Pycnopodia* is usually found at or below the water line in the intertidal and our samples were usually taken above the water line. Similar variations of less mobile or sessile organisms are most likely due to sample size.

Working on the assumption that the populations are largely perennial, the data have been treated as continua and analyzed by life zones for the two study areas (Tables 30 and 31).

The most common animal, by far, was the purple sea urchin, *Strongylocentrotus purpuratus*. Overall, this urchin represented 43.7% of animals counted an all zones. It also occurred with the highest overall frequencies: from 57.7% of the quadrats in Zone "A" of the North Control area to 89.7% in Zone B of the same area. In terms of total numbers in all zones, the purple sea urchin was followed in abundance (in

descending order) by: *Anthopleura elegantissima* (8.9%), the Acmaeidae (8.9%), *Tegula brunnea* (8.8%), *T. funebralis* (7.5%), *Mytilus californianus* (5.2%), *Epiactis prolifera* (4.2%), *Mopalia* spp./*Nuttallina californica* (3.2%), *Tonicella lineata* (1.7%), *Katharina tunicata* (1.6%), and *Leptasterias* spp. (1.1%). Together, these 12 species represent 94.8% of the 32 invertebrate species counted in the quadrats.

Confidence intervals calculated for the means of these same animals by zone (Tables 32 through 34) indicate that their populations are established well enough, even at the 95% level, to serve as possible indices of biotic change. Several species in both study areas show excellent agreement in their means and confidence intervals. For example, in Zone B several species demonstrate consistent values at the 95% level: *Epiactis prolifera* occurred with a mean of 1.23 $\pm$0.74 individuals per $\frac{1}{4}m^2$ (2.7 ft^2) in the Central Area and a mean of 1.05$\pm$0.97 in the Control Area; the Acmaeidae showed means of 2.19 $\pm$0.80 and 2.43 $\pm$0.95 in the Central and Control Areas, respectively; *Tegula brunnea* had means of 2.34 $\pm$1.00 in the Central Area and 2.23 $\pm$1.71 in the Control Area; and *Strongylocentrotus purpuratus* showed means of 17.89 $\pm$4.84 and 20.26 $\pm$5.19 for the two areas (Table 33).

Zone C also contained consistent and ubiquitous species at the 95% level, among them: *Epiactis prolifera* with means of 2.22 $\pm$1.31 in the Central Area and 2.92 $\pm$1.44 in the Control Area; the Acmaeidae with means of 2.07 $\pm$1.01 and 2.14 $\pm$0.98 in the same areas; and *Strongylocentrotus purpuratus* with values of 19.19 $\pm$5.01 in the Central Area and 16.35 $\pm$5.89 in the Control Area (Table 34).

The animals in Zone A of the two study areas cannot be compared since

too few samples (eight) were taken at this height in the Central Area to provide statistical significance. However, the means and confidence intervals of the dominant invertebrates in the North Control Zone A, where 26 quadrats were sampled, are presented (Table 32).

It is interesting to note that Zone A, the area which experiences the greatest amount of daily exposure, supported the highest mean total number of animals per ¼m^2 (2.7 ft^2) quadrat: 49.15 organisms for the two study areas. This area also supported fewer species than Zones B and C. In general, it appears that numbers of organisms per ¼m^2 decrease with decreasing vertical height: Zone B showed an average of 38.34 animals per ¼m^2 (2.7 ft^2) in the two areas and Zone C showed an average of 35.66 organisms (Tables 30 and 31).

Intertidal Algae (Soft Algae).

Dry weight (biomass) measurements for a total of 48 species of soft red, green and smaller brown algae from a total of 207 quarter-meter quadrats were obtained (Appendices XVIII - XXVII). Twenty six quadrats were sampled from Zone A, 106 from Zone B and 75 from Zone C; of these, a total of 119 quadrats from the Central Area and 88 quadrats from the Control Area were examined. The 207 quadrats represent 79% of the total quadrats occupied in the intertidal.

Zone A. In the Central Area, where only eight samples were taken, *Odonthalia floccosa* was by far dominant, representing 93% of the total mean biomass. However, in the Control Area, where 18 samples were taken, *Endocladia muricata* was dominant with 63.2% of the total mean biomass and a frequency of 72.2%. *O. floccosa* was second in abundance and

TABLE 24. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone A - Central Area - Mendocino Power Plant Site - June 1972 through February 1973.

Species	Upwelling Period (June 1972) Sum	Percent freq.	Mean	Davidson Period (Oct 72-Feb 73) Sum	Percent freq.	Mean
COELENTERATA						
Epiactis prolifera	0	0.0	0.00	1	20.0	0.20
MOLLUSCA						
Acmaeidae †	10	100.0	3.33	16	100.0	3.20
Katharina tunicata	7	100.0	2.33	16	80.0	3.20
Mopalia spp.	15*	100.0	5.00			
Mytilus californianus	11	100.0	3.67	96	100.0	19.20
Nuttallina californica	0	0.0	0.00	58	80.0	11.60
Tegula funebralis	0	0.0	0.00	19	20.0	3.80
Tonicella lineata	2	33.3	0.67	3	60.0	0.60
ECHINODERMATA						
Leptasterias spp.	2	66.7	0.67	7	40.0	1.40
Strongylocentrotus purpuratus	26	100.0	0.67	81	80.0	16.20
Total ¼ m^2 Quadrats		3			5	

* This figure probably includes numbers of *Nuttallina californica* earlier misidentified as a *Mopalia* sp.

† The limpet genera *Acmaea*, *Notoacmea* and *Collisella* (McLean 1969) have been lumped in this study at the family level to avoid taxonomic difficulties.

TABLE 25. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone A - North Control Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Davidson Period (Nov. 71)			Upwelling Period (May & Jun 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	2	25.0	0.50	2	12.5	0.25	13	28.6	0.93
Anthopleura xanthogrammica	0	0.0	0.00	0	0.0	0.00	6	28.6	0.43
Epiactis prolifera	0	0.0	0.00	3	25.0	0.37	0	0.0	0.00
MOLLUSCA									
Acmaeidae	44	100.0	11.0	133	87.5	16.62	196	100.0	14.00
Katharina tunicata	1	25.0	0.25	7	50.0	0.87	13	35.7	0.93
Mopalia spp.	47*	100.0	11.75	36*	87.5	4.50	74*	50.0	5.29
Mytilus californianus	112	100.0	28.00	176	87.5	22.00	48	50.0	3.43
Nuttallina californica	0	0.0	0.00	0	0.0	0.00	5	21.4	0.36
Tegula funebralis	0	0.0	0.00	0	0.0	0.00	2	7.1	0.14
Thais emarginata	0	0.0	0.00	0	0.0	0.00	15	21.4	1.07
Tonicella lineata	2	25.0	0.50	1	12.5	0.12	2	14.3	0.14
ARTHROPODA									
Balanus cariosus	0	0.0	0.00	0	0.0	0.00	113	21.4	8.07
Pollicipes polymerus	7	25.0	1.75	17	12.5	2.12	54	21.4	3.86

TABLE 25. (cont.)

Species	Davidson Period (Nov 71)			Upwelling Period (May & Jun 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
ECHINODERMATA									
Leptasterias spp	1	25.0	0.25	3	37.5	0.37	22	57.1	1.57
Strongylocentrotus purpuratus	36	100.0	9.00	99	87.5	12.37	9	28.6	0.64
Total ¼ m^2 Quadrats		4			8			14	

*These figures probably include numbers of *Nuttallina californica* earlier misidentified as *Mopalia* sp.

TABLE 26. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone B - Central Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Davidson Period (Nov 71-Jan 72)			Upwelling Period (Apr 73-Jul 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	122	40.0	4.84	60	18.2	2.73	33	21.2	1.00
Anthopleura xanthogrammica	9	16.0	0.36	1	4.5	0.05	1	3.0	0.03
Ballanophyllia elegans	0	0.0	0.00	0	0.0	0.00	10	9.1	0.45
Epiactis prolifera	22	16.0	0.88	36	18.2	1.64	41	30.3	1.24
MOLLUSCA									
Acmaeidae	66	48.0	2.64	41	50.0	1.86	68	48.5	2.06
Calliostoma costatum	22	32.0	0.88	1	4.5	0.05	2	6.1	0.06
Cryptochiton stelleri	4	16.0	0.16	3	13.6	0.14	0	0.0	0.00
Katharina tunicata	21	36.0	0.84	29	36.4	1.32	17	30.3	0.52
Mopalia spp.	10	36.0	0.40	7	18.2	0.32	9	24.2	0.27
Mytilus californianus	5	16.0	0.20	17	22.7	0.77	36	18.2	1.09
Tegula brunnea	15	24.0	0.60	74	63.6	3.36	89	48.5	2.70
Tegula funebralis	139	20.0	5.56	0	0.0	0.00	183	36.4	5.55
Tonicella lineata	31	48.0	1.24	13	27.3	0.59	9	21.2	0.27
ARTHROPODA									
Balanus cariosus	0	0.0	0.00	0	0.0	0.00	11	12.1	0.33
Cancer spp.	2	8.0	0.08	1	4.5	0.05	5	12.1	0.15

TABLE 26. (cont.)

Species	Davidson Period (Nov 71-Jan 72)			Upwelling Period (Apr 72-Jul 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
ARTHROPODA (cont.)									
Loxorhynchus crispatus	1	4.0	0.04	0	0.0	0.00	0	0.0	0.00
Pugettia producta	7	20.0	0.28	3	13.6	0.14	38	39.4	1.15
ECHINODERMATA									
Henricia leviuscula	0	0.0	0.00	1	4.5	0.05	0	0.0	0.00
Leptasterias spp.	9	20.0	0.36	8	22.7	0.36	23	39.4	0.70
Pisaster ochraceous	4	8.0	0.16	0	0.0	0.00	1	3.0	0.03
Strongylocentrotus purpuratus	351	72.0	14.05	583	72.7	26.50	497	63.6	15.06
Total ¼ m^2 Quadrats		25			22			33	

TABLE 27. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone B - North Control Area - Mendocino Power Plant Site - November 1971 Through February 1973.

Species	Davidson Period (Nov 71-Dec 71)			Upwelling Period (Apr 72-May 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	216	87.5	27.0	67	25.0	5.58	112	36.8	5.90
Anthopleura xanthogrammica	1	12.5	0.12	12	50.0	1.00	12	42.1	0.63
Epiactis prolifera	0	0.0	0.00	30	33.3	2.50	11	21.1	0.50
MOLLUSCA									
Acmaeidae	18	50.0	2.25	20	41.7	1.67	54	68.4	2.84
Calliostoma costatum	0	0.0	0.00	2	16.7	0.17	0	0.0	0.00
Katharina tunicata	5	50.0	0.62	6	25.0	0.50	33	63.2	1.74
Mopalia spp.	2	12.5	0.25	4	25.0	0.33	11	15.8	0.58
Mytilus californianus	1	12.5	0.12	4	25.0	0.33	17	47.4	0.89
Nuttallina californica	0	0.0	0.00	0	0.0	0.00	37	36.8	1.95
Searlesia dira	0	0.0	0.00	0	0.0	0.00	1	5.3	0.05
Tegula brunnea	0	0.0	0.00	51	50.0	4.25	37	26.3	1.95
Tegula funebralis	94	50.0	11.75	2	16.7	0.17	45	31.6	2.37
Thais emarginata	0	0.0	0.00	0	0.0	0.00	5	5.3	0.26
Tonicella lineata	0	0.0	0.00	3	16.7	0.25	13	47.4	0.68

TABLE 27. (cont.)

Species	Davidson Period (Nov 71-Dec 71)			Upwelling Period (Apr 72-May 72)			Davidson Period (Oct 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
ARTHROPODA									
Balanus cariosus	6	25.0	0.75	0	0.0	0.00	6	10.5	0.32
Cancer spp.	0	0.0	0.00	0	0.0	0.00	1	5.6	0.05
Pugettia producta	0	0.0	0.00	5	25.0	0.42	2	10.5	0.10
Tetraclita squamosa	0	0.0	0.00	0	0.0	0.00	1	5.6	0.05
ECHINODERMATA									
Leptasterias spp.	0	0.0	0.00	2	16.7	0.17	14	36.8	0.74
Pisaster ochraceous	0	0.0	0.00	1	8.3	0.08	1	5.6	0.05
Strongylocentrotus purpuratus	81	50.0	10.12	319	100.0	26.58	390	100.0	20.55
Total ¼ m^2 Quadrats		8			12			19	

TABLE 28. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone C - Central Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Davidson Period (Nov 71-Jan 72)				Upwelling Period (Apr 72-Jul 72)				Davidson Period (Dec 72-Feb 73)			
	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean
COELENTERATA												
Anthopleura elegantissima	51	38.9		2.83	0	0.0		0.00	7	23.1		0.54
Anthopleura xanthogrammica	0	0.0		0.00	1	3.7		0.04	4	23.1		0.31
Ballanophyllia elegans	1	5.6		0.06	5	7.4		0.19	6	7.7		0.46
Epiactis prolifera	44	27.8		2.44	44	33.3		1.63	41	53.8		3.15
Tealia crassicornis	20	11.1		1.11	0	0.0		0.00	0	0.0		0.00
MOLLUSCA												
Acmaeidae	61	44.4		3.39	37	37.0		1.37	22	46.2		1.69
Archidoris montereyensis	1	5.6		0.06	0	0.0		0.00	0	0.0		0.00
Calliostoma costatom	1	5.6		0.06	3	7.4		0.11	3	23.1		0.23
Cryptochiton stelleri	0	0.0		0.00	2	7.4		0.07	2	15.4		0.15
Haliotis rufescens	1	5.6		0.06	1	3.7		0.04	0	0.0		0.00
Hermissenda crassicornis	1	5.6		0.06	0	0.0		0.00	0	0.0		0.00
Katharina tunicata	0	0.0		0.00	0	0.0		0.00	2	15.4		0.15
Mopalia spp.	2	11.1		0.11	0	0.0		0.00	2	15.4		0.15
Mytilus californianus	0	0.0		0.00	3	7.4		0.11	1	7.7		0.08
Rostanga pulchra	2	11.1		0.11	0	0.0		0.00	0	0.0		0.00
Searlesia dira	0	0.0		0.00	2	7.4		0.07	0	0.0		0.00
Tegula brunnea	47	50.0		2.61	103	66.6		3.81	38	53.8		93

TABLE 28. (Cont.)

Species	Davidson Period (Nov 71-Jan 72)			Upwelling Period (Apr 72-Jul 72)			Davidson Period (Dec 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
MOLLUSCA (cont.)									
Tegula funebralis	34	33.3	1.94	128	14.8	4.74	12	23.1	0.92
Tonicella lineata	28	38.9	1.56	12	25.9	0.44	20	53.8	1.54
ARTHROPODA									
Cancer spp.	4	11.1	0.22	3	11.1	0.11	0	0.0	0.00
Mimulus foliatus	0	0.0	0.00	0	0.0	0.00	1	7.7	0.08
Pollicipes polymerus	0	0.0	0.00	1	3.7	0.04	0	0.0	0.00
Pugettia producta	9	22.2	0.50	15	22.2	0.56	1	7.7	0.08
ECHINODERMATA									
Henricia leviuscula	1	5.6	0.06	0	0.0	0.00	0	0.0	0.00
Leptasterias spp.	2	11.1	0.11	4	14.8	0.15	4	23.1	0.31
Pisaster ochraceous	1	5.6	0.06	0	0.0	0.00	0	0.0	0.00
Pycnopodia helianthoides	1	5.6	0.06	0	0.0	0.00	0	0.0	0.00
Strongylocentrotus purpuratus	357	94.4	19.83	574	81.5	21.26	182	84.6	14.00
Total ¼ m^2 Quadrats		18			27			13	

TABLE 29. Abundance of Intertidal Invertebrates Found in ¼ m^2 Quadrats by Oceanographic Period - Zone C - North Control Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Davidson Period (Nov 71-Jan 72)			Upwelling Period (Apr 72-Jul 72)			Davidson Period (Dec 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	103	40.0	5.15	2	12.5	0.13	114	53.3	7.60
Anthopleura xanthogrammica	0	0.0	0.00	0	0.0	0.00	1	6.6	0.07
Epiactis prolifera	41	30.0	2.05	58	62.5	3.63	50	53.3	3.33
Tealia crassicornis	3	5.0	0.15	0	0.0	0.00	0	0.0	0.00
MOLLUSCA									
Acmaeidae	58	55.0	2.90	36	81.2	2.25	15	26.6	1.00
Calliostoma costatum	8	25.0	0.40	4	12.5	0.25	3	6.6	0.20
Cryptochiton stelleri	0	0.0	0.00	3	18.7	0.19	1	6.6	0.07
Haliotis rufescens	0	0.0	0.00	1	6.2	0.06	1	6.6	0.07
Katharina tunicata	1	5.0	0.05	1	6.2	0.06	7	13.3	0.47
Mopalia spp.	2	10.0	0.10	1	6.2	0.06	5	20.0	0.33
Rostanga pulchra	2	10.0	0.10	0	0.0	0.00	0	0.0	0.00
Searlesia dira	0	0.0	0.00	0	0.0	0.00	1	6.6	0.07
Tegula brunnea	143	80.0	7.15	150	93.7	9.38	134	73.3	8.93
Tegula funebralis	19	15.0	0.95	0	0.0	0.00	70	60.0	4.67
Tonicella lineata	17	25.0	0.85	10	31.2	0.63	6	20.0	0.40

TABLE 29. (cont.)

Species	Davidson Period (Nov 71-Jan 72)			Upwelling Period (Apr 72-Jul 72)			Davidson Period (Dec 72-Feb 73)		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
ARTHROPODA									
Cancer spp.	0	0.0	0.00	1	6.2	0.06	1	6.6	0.07
Loxorhynchus crispatus	1	5.0	0.05	0	0.0	0.00	0	0.0	0.00
Pugettia producta	3	15.0	0.15	7	31.2	0.44	0	0.0	0.00
ECHINODERMATA									
Henricia leviuscula	1	5.0	0.05	0	0.0	0.00	0	0.0	0.00
Lepasterias spp.	0	0.0	0.00	4	12.5	0.25	6	33.3	0.40
Pisaster ochraceous	1	5.0	0.05	0	0.0	0.00	0	0.0	0.00
Pycnopodia helianthoides	0	0.0	0.00	1	6.2	0.06	0	0.0	0.00
Strongylocentrotus purpuratus	428	90.0	21.40	243	93.7	15.19	163	46.6	10.87
Total ¼ m^2 Quadrats		20			16			15	

TABLE 30. Abundance of Intertidal Invertebrates, from ¼ m^2 Quadrats by Stratified Zone - Central Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Zone A			Zone B			Zone C		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	0	0.0	0.00	215	26.2	2.69	58	15.5	1.00
Anthopleura xanthogrammica	0	0.0	0.00	10	7.5	0.13	5	5.2	0.09
Ballanophyllia elegans	0	0.0	0.00	7	3.8	0.09	12	6.9	0.21
Epiactis prolifera	1	12.5	0.12	99	22.5	1.23	129	36.2	2.22
Tealia sp.	0	0.0	0.00	0	0.0	0.00	20	3.4	0.34
ARTHROPODA									
Balanus cariosus	0	0.0	0.00	11	5.0	0.14	0	0.0	0.00
Cancer sp.	0	0.0	0.00	8	8.8	0.10	7	12.1	0.12
Loxorhynchus crispatus	0	0.0	0.00	1	1.2	0.01	0	0.0	0
Mimulus foliatus	0	0.0	0.00	0	0.0	0.00	1	1.7	0.02
Pollicipes polymerus	0	0.0	0.00	0	0.0	0.00	1	1.7	0.02
Pugettia producta	0	0.0	0.00	48	23.8	0.60	25	18.9	0.43
MOLLUSCA									
Acmaeidae	26	87.5	3.25	175	48.8	2.19	120	41.4	2.07
Archidoris montereyensis	0	0.0	0.00	25	13.7	0.31	1	1.7	0.02
Calliostoma spp.	0	0.0	0.00	0	0.0	0.00	7	10.3	0.12
Cryptochiton stelleri	0	0.0	0.00	7	8.8	0.09	4	6.9	0.07
Searlesia dira	0	0.0	0.00	0	0.0	0.00	2	3.4	0.03
Haliotis rufescens	0	0.0	0.00	0	0.0	0.00	2	3.4	0.03
Hermissenda crassicornis	0	0.0	0.00	0	0.0	0.00	1	1.7	0.02

TABLE 30 (cont.)

Species	Zone A Sum	Zone A Percent freq.	Zone A Mean	Zone B Sum	Zone B Percent freq.	Zone B Mean	Zone C Sum	Zone C Percent freq.	Zone C Mean
MOLLUSCA (cont.)									
Katharina tunicata	23	100.0	2.88	67	33.8	0.84	2	1.7	0.03
Mopalia spp.	15	37.5	1.88	26	26.2	0.33	4	6.9	0.07
Mytilus californianus	107	100.0	13.75	58	20.0	0.73	4	5.2	0.07
Nuttallina californica	58	50.0	7.25	0	0.0	0.00	0	0.0	0.00
Rostanga pulchra	0	0.0	0.00	0	0.0	0.00	2	3.4	0.03
Tegula brunnea	0	0.0	0.00	187	43.8	2.34	188	58.6	3.24
Tegula funebralis	19	12.5	2.38	332	26.2	4.15	174	22.4	3.00
Tonicella lineata	5	50.0	0.63	53	30.0	0.66	60	36.2	1.03
ECHINODERMATA									
Henricia leviuscula	0	0.0	0.00	1	1.2	0.01	1	1.7	0.02
Leptasterias spp.	9	50.0	1.12	40	30.0	0.50	10	15.5	0.17
Pisaster ochraceous	0	0.0	0.00	5	3.8	0.06	1	1.7	0.02
Pycnopodia helianthoides	0	0.0	0.00	0	0.0	0.00	1	1.7	0.02
Strongylocentrotus purpuratus	107	87.5	13.75	1431	71.2	17.89	1113	86.2	19.19
MEAN TOTAL NUMBER ANIMALS/¼ m^2			46.25			35.07			33.71
TOTAL NUMBER QUADRATS			8			80			58

TABLE 31. Abundance of Intertidal Invertebrates, from ¼ m^2 Quadrats by Stratified Zone - North Control Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Zone A			Zone B			Zone C		
	Sum	Percent freq.*	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
COELENTERATA									
Anthopleura elegantissima	17	23.1	0.65	395	41.0	10.10	219	35.3	4.10
Anthopleura xanthogrammica	6	15.4	0.23	25	38.5	0.64	1	2.0	0.02
Epiactis prolifera	3	7.7	0.12	41	20.5	1.05	149	47.1	2.92
Tealia sp.	0	0.0	0.00	0	0.0	0.00	3	2.0	0.06
ARTHROPODA									
Balanus cariosus	113	11.5	4.34	12	12.8	0.31	0	0.0	0.00
Cancer sp.	0	0.0	0.00	1	2.6	0.03	2	3.9	0.04
Loxorhynchus crispatus	0	0.0	0.00	0	0.0	0.00	1	2.0	0.02
Pollicipes polymerus	78	19.2	3.00	0	0.0	0.00	0	0.0	0.00
Pugettia producta	0	0.0	0.00	7	15.4	0.18	10	15.7	0.20
Tetraclita squamosa	0	0.0	0.00	1	2.6	0.03	0	0.0	0.00
MOLLUSCA									
Acmaeidae	373	80.7	14.34	95	56.4	2.44	109	53.0	2.14
Calliostoma spp.	0	0.0	0.00	2	5.1	0.05	15	15.7	0.29
Cryptochiton stelleri	0	0.0	0.00	0	0.0	0.00	4	7.8	0.08
Haliotis rufescens	0	0.0	0.00	0	0.0	0.00	2	3.9	0.04
Katharina tunicata	21	38.5	0.81	44	51.3	1.16	9	7.8	0.18
Mopalia spp.	162*	80.7	6.23	17	25.6	0.45	8	11.8	0.16
Mytilus californianus	336	69.2	12.92	22	28.2	0.56	0	0.0	0.00

TABLE 31 (cont.)

Species	Zone A Sum	Zone A Percent freq.*	Zone A Mean	Zone B Sum	Zone B Percent freq.	Zone B Mean	Zone C Sum	Zone C Percent freq.	Zone C Mean
MOLLUSCA (Cont.)									
Nuttallina californica	0	0.0	0.00	37	15.4	0.95	0	0.0	0.00
Rostanga pulchra	0	0.0	0.00	0	0.0	0.00	2	3.9	0.04
Searlesia dira	0	0.0	0.00	1	2.6	0.03	1	2.0	0.02
Tegula brunnea	0	0.0	0.00	88	30.8	2.26	427	82.4	8.37
Tegula funebralis	2	3.8	0.08	141	28.2	3.62	89	23.5	1.74
Thais emarginata	15	11.5	0.58	5	2.6	0.13	0	0.0	0.00
Tonicella lineata	5	15.4	0.19	16	28.2	0.41	33	25.5	0.65
ECHINODERMATA									
Henricia leviuscula	0	0.0	0.00	0	0.0	0.00	1	2.0	0.02
Leptasterias spp.	26	46.2	1.00	16	25.6	0.41	10	13.7	0.20
Pisaster ochraceous	0	0.0	0.00	2	5.1	0.05	1	2.0	0.02
Pycnopodia helianthoides	0	0.0	0.00	0	0.0	0.00	1	2.0	0.02
Strongylocentrotus purpuratus	144	57.7	5.54	790	89.7	20.26	834	78.5	16.35
MEAN TOTAL ANIMALS/¼ m^2		50.05			45.08			37.88	
TOTAL NUMBER QUADRATS		26			39			51	

* This figure probably includes numbers of *Nuttallina californica* earlier misidentified as *Mopalia* sp.

TABLE 32. Means and Confidence Intervals of Six Intertidal Invertebrates Found in ¼ m^2 Quadrats - North Control Area - Zone A - Mendocino Power Plant Site - November 1971 through February 1973.

Species	North Control Area			
		Confidence Intervals of the Mean		
	Mean	50%	70%	95%
Acmaeidae	15.85	±1.89	±2.93	±5.70
Mopalia spp/*Nuttallina californica**	6.23	±1.09	±1.69	±3.28
Mytilus californianus	12.85	±1.99	±3.08	±5.99
Pollicipes polymerus	3.00	±1.24	±1.73	±3.37
Leptasterias spp.	1.00	±0.25	±0.38	±0.74
Strongylocentrotus purpuratus	5.54	±1.12	±1.73	±3.37

*Treated as a group because of taxonomic confusion early in the study.

TABLE 33. Comparison of Means and Confidence Intervals of Eight Intertidal Invertebrates Found in ¼ m^2 Quadrats - Central and North Control Areas - Zone B - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Central Area				North Control Area			
	Mean	Confidence Intervals of the Mean 50%	70%	95%	Mean	Confidence Intervals of the Mean 50%	70%	95%
Anthopleura elegantissima	2.69	±0.57	±0.88	±1.68	10.15	±2.10	±3.24	±6.27
Epiactis prolifera	1.23	±0.25	±0.39	±0.74	1.05	±0.32	±0.50	±0.97
Acmaeidae	2.19	±0.27	±0.41	±0.80	2.43	±0.32	±0.49	±0.95
Tegula brunnea	2.34	±0.34	±0.52	±1.00	2.23	±0.57	±0.88	±1.71
Tegula funebralis	4.15	±0.90	±1.39	±2.66	3.61	±0.88	±1.35	±2.62
Katharina tunicata	0.84	±0.13	±0.20	±0.38	1.13	±0.18	±0.28	±0.55
Mytilus californianus	0.73	±0.24	±0.37	±0.70	0.56	±0.13	±0.20	±0.38
Strongylocentrotus purpuratus	17.89	±1.64	±2.53	±4.84	20.26	±1.73	±2.68	±5.19

TABLE 34. Comparison of Means and Confidence Intervals of Seven Intertidal Invertebrates Found in ¼ m^2 Quadrats - Central and North Control Areas - Zone C - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Central Area				North Control Area			
	Mean	Confidence Intervals of the Mean 50%	70%	95%	Mean	Confidence Intervals of the Mean 50%	70%	95%
Anthopleura elegantissima	1.00	±0.34	±0.53	±1.01	4.29	±0.95	±1.47	±2.83
Epiactis prolifera	2.22	±0.44	±0.68	±1.31	2.92	±0.48	±0.75	±1.44
Acmaeidae	2.07	±0.34	±0.53	±1.01	2.14	±0.33	±0.51	±0.98
Tegula brunnea	3.26	±0.46	±0.70	±1.35	8.37	±1.00	±1.55	±2.99
Tegula funebralis	2.83	±0.96	±1.48	±2.85	1.74	±0.34	±0.52	±1.00
Tonicella lineata	1.03	±0.17	±0.26	±0.51	0.65	±0.13	±0.20	±0.38
Strongylocentrotus purpuratus	19.19	±1.69	±2.60	±5.01	16.35	±1.98	±3.06	±5.89

frequency with 22.9% and 66.7%, respectively (Table 35). With a total of 19 species, Zone A possessed the lowest numbers of soft algae types.

Zone B. In this zone *Odonthalia floccosa* was again dominant, although it represented a lower total percentage of the mean biomass. In the Central Area it constituted 37.3% with the frequency of 61.8% and in the Control Area accounted for 60.6% of the algal biomass and had a frequency of 63.2%, (Table 36).

In the Central Area, ten species of red algae represented 89.1% of the total average biomass; in descending order of abundance, they were: *Odonthalia floccosa, Endocladia muricata, Halosaccion glandiforme, Cryptopleura lobulifera, Rhodomela larix, Iridaea splendens, Iridaea flaccida, Gastroclonium coulteri, Microcladia borealis* and *Gigartina canaliculata*. Twenty-seven other species of soft algae accounted for the remaining 10.9%. In the Control Area, 7 of 23 species found in the quadrats composed 95.6% of the total mean biomass. In descending order, the species were: *O. floccosa, R. larix, C. lobulifera, E. muricata, I. flaccida, H. glaandiforme* and *M. borealis*.

The figures for total average biomass in Zone B of the two study areas are remarkably close: 51.49 gms/¼m^2 (2.6 oz/ft^2) in the Central Area and 54.57 gms/¼m^2 (2.8 oz/ft^2) in the Control Area.

Zone C. Of the three zones studied, Zone C showed the lowest total mean biomass figures: 21.20 gms/¼m^2 (1.1 oz/ft^2) in the Central Area and 26.53 gms/¼m^2 (1.4 oz/ft^2) in the Control Area (Table 37). Two species appear dominant over the others in this zone; *Iridaea flaccida* and *Odonthalia floccosa*. Together they represent 40.7% of the biomass in the Central Area and 38.4%

of the biomass in the Control Area. In the Central Area, these species with (in descending order) *Rhodomela larix, Codium fragile, Microcladia borealis* and *Cryptopleura lobulifera* form 72.2% of the total mean biomass.

In the Control Area, eight species of red algae composed 77.7% of the total mean biomass found in the quadrats. In descending order of abundance, they are: *Iridaea flaccida, Odonthalia floccosa, Prionitis lanceolata, Schizymenia pacifica* (although only found once), *Polysiphonia hendryi, Laurencia spectabilis, Gastroclonium coulteri* and *Rhodomela larix.*

The reason for diminished algal biomass in Zone C is unclear. Grazing pressure in this zone that is less frequently exposed by tides is a possibility; however, the fact that average numbers of the major herbivore, *Strongylocentrotus purpuratus,* found in Zones B and C (Tables 30 and 31) are similar, seems to rule out the factor of grazing.

Although confidence intervals for the soft algae were not calculated, the raw data (Appendices XVIII through XXVII) indicate that there is great seasonal and spatial variation of abundance among the species collected in the samples. The seasonal variation of total algal biomass in Zone B may be indicated by the monthly mean weights of the samples (Figure 8). According to these figures, algal abundance began increasing with the beginning of summer, perhaps in response to upwelling, to reach an annual peak in November, 1972. This peak is due solely to high amounts of one red algae, *Odonthalia floccosa,* found in four samples in both the Central and North Control Areas. After this the monthly, mean totals drop drastically, possibly related to diminished nutrients and winter storms.

TABLE 35. Average Dry Weight and Percent Frequency of Occurrence of Soft Algal Species found in ¼ m^2 Quadrats - Zone A - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Central Area Mean dry wt. (g)	Central Area Percent freq.	North Control Area Mean dry wt. (g)	North Control Area Percent freq.
RHODOPHYTA:				
Cryptopleura lobulifera	0.34	25.0	0.92	16.7
Endocladia muricata	0.06	12.5	33.35	72.2
Gigartina cristata	0.00	0.0	0.31	55.5
Gigartina sp.	0.00	0.0	0.04	5.5
Halosaccion glandiforme	0.06	12.5	1.33	55.5
Hymenena multiloba	1.06	12.5	0.14	5.5
Iridaea sp.	0.07	25.0	0.57	44.2
Microcladia borealis	0.18	12.5	0.02	5.5
Odonthalia floccosa	30.89	37.5	12.07	66.7
Plocamium pacificum	TR	12.5	0.03	5.5
Plocamium violaceum	0.00	0.0	1.07	22.2
Porphyra sp.	0.00	0.0	0.03	5.5
Pterochondria woodii	0.15	12.5	0.00	0.0
Rhodoglossum affine	0.00	0.0	0.02	11.1
CHLOROPHYTA:				
Cladophora hemisphaerica	0.00	0.0	2.50	50.0
Spongomorpha coalita	TR	12.5	0.00	0.0
Ulva sp.	0.00	0.0	0.02	5.5
PHAEOPHYTA:				
Colpomenia sinuosa	0.00	0.0	<0.01	5.5
Heterochordaria abietina	0.09	25.0	0.29	27.8
TOTALS (average grams/¼ m^2)	32.90 (1.65 oz/ft^2)		52.73 (2.64 oz/ft^2)	
NUMBER OF STATIONS:	8		18	

TABLE 36. Average Dry Weight and Percent Frequency of Occurrence of Soft Algal Species found in ¼ m^2 Quadrats - Zone B - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Central Area		North Control Area	
	Mean dry wt. (g)	Percent freq.	Mean dry wt. (g)	Percent freq.
RHODOPHYTA:				
Botryoglossum farlowianum	<0.01	1.5	0.00	0.0
Calliathamnion sp.	TR	1.5	0.00	0.0
Constantinea simplex	0.00	0.0	0.14	5.3
Cryptopleura lobulifera	3.43	39.7	4.93	42.2
Dilsea californica	0.00	0.0	0.05	2.6
Endocladia muricata	6.42	14.7	2.48	21.0
Farlowia mollis	0.04	2.9	0.00	0.0
Gastroclonium coulteri	2.14	13.2	0.06	2.6
Gelidium coulteri	0.26	2.9	0.02	2.6
Gigartina agardhii	0.05	2.9	0.00	0.0
Gigartina californica	0.22	11.8	0.00	0.0
Gigartina canaliculata	1.12	10.3	0.54	7.9
Gigartina papillata/ Gigartina cristata *	0.53	25.0	0.18	10.5
Gloiosiphonia californica	0.25	4.4	0.00	0.0
Halosaccion glandiforme	3.75	28.0	1.43	13.2
Hymenena flabelligera	0.21	4.4	0.52	2.6
Hymenena multiloba	0.81	16.2	0.00	0.0
Iridaea flaccida	2.71	61.8	1.58	26.3
Iridaea heterocarpum	0.55	5.9	0.00	0.0
Iridaea splendens	2.86	10.3	0.09	5.3
Iridaea sp.	0.00	0.0	<0.01	5.3

TABLE 36 (cont.)

Species	Central Area Mean dry wt. (g)	Central Area Percent freq.	North Control Area Mean dry wt. (g)	North Control Area Percent freq.
RHODOPHYTA: (cont.)				
Laurencia spectabilis	0.10	14.7	0.00	0.0
Microcladia borealis	1.42	38.2	1.26	29.0
Microcladia coulteri	<0.01	1.5	0.00	0.0
Odonthalia floccosa	19.18	61.8	13.11	63.2
Plocamium violaceum	0.09	8.8	0.14	10.5
Polysiphonia hendryi	0.00	0.0	0.29	5.3
Polysiphonia sp.	0.04	4.4	0.10	2.6
Prionitis linearis	0.00	0.0	0.04	2.6
Pterosiphonia dendroidea	0.03	1.5	0.00	0.0
Rhodomela larix	2.88	13.2	7.37	18.4
Schizymenia pacifica	0.25	4.4	0.00	0.0
CHLOROPHYTA:				
Codium fragile	1.85	5.9	0.00	0.0
Spongomorpha coalita	0.02	1.5	0.00	0.0
Ulva lobata	0.21	8.8	<0.01	5.3
PHAEOPHYTA:				
Colpomenia sinuosa	0.00	0.0	<0.01	5.3
Heterochordaria abietina	0.03	2.9	0.23	13.2
TOTALS (average grams/¼ m^2)	51.49 (2.57 oz/ft^2)		54.57 (2.73 oz/ft^2)	
TOTAL NUMBER OF STATIONS	68		38	

* Treated as a complex due to confusing morphological variations.

TABLE 37. Average Dry Weight and Percent Frequency of Occurrence of Soft Algal Species found in ¼ m^2 Quadrats - Zone C - Mendocino Power Plant Site - January 1972 through February 1973.

Species	Central Area Mean dry wt. (g)	Central Area Percent freq.	North Control Area Mean dry wt. (g)	North Control Area Percent freq.
RHODOPHYTA:				
Amplisiphonia pacifica	0.00	0.0	<0.01	3.1
Botryoglossum farlowianum	0.08	7.0	0.76	18.7
Cryptopleura lobulifera	1.05	30.2	0.31	21.9
Farlowia mollis	0.00	0.0	0.02	6.2
Gastroclonium coulteri	<0.01	2.3	1.33	25.0
Gelidium sp.	0.00	0.0	0.03	6.2
Gigartina californica	0.33	4.6	0.00	0.0
Gigartina canaliculata	0.45	4.6	0.61	15.6
Gigartina papillata/ Gigartina cristata	0.10	16.3	0.09	18.7
Halosaccion glandiforme	0.29	11.6	0.00	0.0
Hymenena flabelligera	0.57	9.3	0.44	9.4
Hymenena multiloba	0.00	0.0	0.13	6.2
Hymenena sp.	0.16	4.6	0.17	15.6
Iridaea flaccida	3.90	34.9	6.24	43.7
Iridaea splendens	0.40	11.6	0.00	0.0
Iridaea sp.	0.55	7.0	0.00	0.0
Laurencia spectabilis	0.61	32.6	1.36	40.6
Microcladia borealis	1.24	23.2	0.28	18.7
Microcladia coulteri	0.20	7.0	0.08	3.1
Odonthalia floccosa	4.74	39.5	3.95	18.7

TABLE 37 (cont.)

Species	Central Area Mean dry wt. (g)	Central Area Percent freq.	North Control Area Mean dry wt. (g)	North Control Area Percent freq.
RHODOPHYTA: (cont.)				
Opuntiella californica	0.00	0.0	0.39	3.1
Plocamium violaceum	TR	2.3	0.06	3.1
Polysiphonia californica	0.36	7.0	0.78	3.1
Polysiphonia hendryi	0.58	4.6	1.80	21.9
Polysiphonia pacifica	<0.01	2.3	0.00	0.0
Polysiphonia sp.	0.59	11.6	0.00	0.0
Prionitis lanceolata	0.03	2.3	2.79	12.5
Pterochondria woodii	0.07	4.6	0.80	21.9
Pterosiphonia dendroidea	0.17	7.0	0.00	0.0
Ptilota hypnoides	<0.01	2.3	<0.01	3.1
Rhodomela larix	2.40	13.9	1.32	18.7
Schizymenia pacifica	0.23	7.0	1.83	3.1
CHLOROPHYTA:				
Codium fragile	1.97	7.0	0.00	0.0
Spongomorpha coalita	0.00	0.0	0.08	3.1
Ulva lobata	0.00	0.0	0.85	21.9
Ulva sp.	0.12	9.3	0.02	3.1
PHAEOPHYTA:				
Colpomenia sinuosa	TR	2.3	<0.01	3.1
TOTALS (average grams/¼ m^2)	21.20 (1.06 oz/ft^2)		26.53 (1.83 oz/ft^2)	
NUMBER OF STATIONS	43		32	

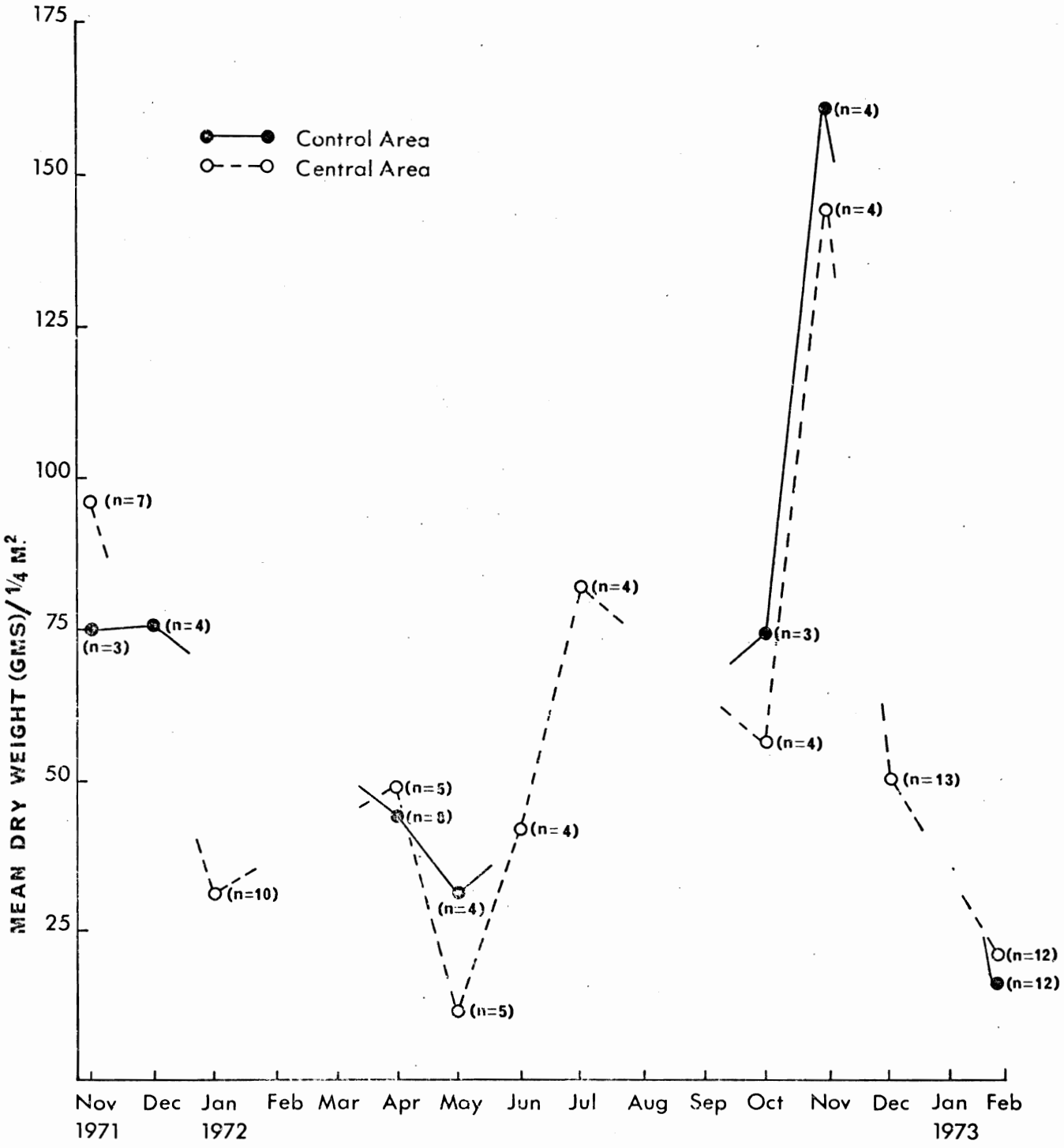

FIGURE 8. Average Monthly Dry Weights of Soft Algae Found in $\frac{1}{4}m^2$ Samples in Zone B, Central and North Control Areas - Mendocino Power Plant Site - November 1971 - February 1973. (N = sample number).

Articulated Coralline Algae:

The percent cover by articulated coralline algae, represented by the genera *Calliarthron*, *Bossiella* and *Corallina*, was visually estimated at 239 quarter-meter quadrats, or 91% of the total quadrats examined (Table 38). No attempt was made to distinguish between the three genera.

The articulated corallines form a significant part of the intertidal algal community, occurring with high frequencies and covering at least an average of 10% of the area in all zones. In general, the amount of area covered by them tends to diminish from the higher zone to the lower zone.

Large Brown Algae

Although correlation of figures of abundance between similar species in the two study areas appears to be very poor, seasonality (Table 39) and zonation (Table 40) of the large brown intertidal algae show up well from the data. For example, during the Upwelling Period, from April through August, the browns are at their peak numbers (Table 39). Their apparent immediate decline in the Oceanic Period is probably due to a low number of samples. During the Davidson Period, when winter storms typically take their toll, numbers of brown algae are much lower.

As might be expected, the number of species of browns increase from the higher zone to the lower zone (Table 40). In Zone A, *Postelsia palmaeformis* were most numerous; and in Zone C, *A. marginata* and *Dictyoneurom californicum* were found in greatest numbers. It should be pointed out that, with the exception of *P. palmaeformis* in Zone A, none of the large browns were found with a frequency greater than 25% and most had frequencies less than 10%.

Table 38. Mean Percent Cover of Articulated Coralline Algae Found in ¼ m^2 Quadrats by Intertidal Zone - Mendocino Power Plant Site - January 1972 through February 1973.

	Central Area			North Control Area		
	Zone A	Zone B	Zone C	Zone A	Zone B	Zone C
Mean percent cover	50.62	20.30	12.79	16.82	13.08	10.47
Percent frequency	100.0	79.1	42.3	72.6	80.6	60.5
Total quadrats	8	67	52	22	39	51

Table 39. Abundance of Intertidal Large Brown Algae found in ¼ m^2 Quadrats by Oceanographic Period - Mendocino Power Plant Site - November 1971 through February 1973.

	Central Area											
	Davidson (Nov 71-Mar 72)				Upwelling (Apr 72-Aug 72)				Oceanic (Sep 72-Oct 72)				Davidson (Nov 72-Feb 73)			
	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean
Laminaria setchellii	0	0.0		0.00	1	1.9		0.02	0	0.0		0.00	8	4.6		0.19
Costaria costata	3	2.3		0.07	32	15.4		0.62	0	0.0		0.00	0	0.0		0.00
Dictyoneurom californicum	18	4.6		0.41	141	5.8		2.72	0	0.0		0.00	0	0.0		0.00
Cystoseira osmundacea	1	2.3		0.02	13	7.7		0.25	0	0.0		0.00	10	9.3		0.23
Egregia menziesii	1	2.3		0.02	2	3.8		0.04	0	0.0		0.00	3	7.0		0.07
Alaria marginata	22	14.0		0.51	152	23.0		2.92	1	12.5		0.13	2	4.6		0.05
Postelsia palmaeformis	0	0.0		0,00	54	3.8		1.04	52	50.0		6.5	0	0.0		0.00
TOTAL QUADRATS		43				52				8				43		

Table 39. (cont.)

	North Control Area											
	Davidson (Nov 71-Mar 72)				Upwelling (Apr 72-Aug 72)				Oceanic (Sep 72-Oct 72)				Davidson (Nov 72-Feb 73)			
	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean	Sum	Percent	freq.	Mean
Desmarestia herbacea	0	0.0		0.00	1	2.8		0.03	0	0.0		0.00	0	0.0		0.00
Dictyoneurom californicum	30	3.1		0.94	19	5.6		0.53	0	0.0		0.00	0	0.0		0.00
Costaria costata	1	3.1		0.03	7	13.9		0.19	0	0.0		0.00	0	0.0		0.00
Laminaria setchellii	1	3.1		0.03	6	2.8		0.17	0	0.0		0.00	0	0.0		0.00
Alaria marginata	1	3.1		0.03	23	16.7		0.64	3	12.5		0.38	1	2.5		0.02
Fucus distichus	0	0.0		0.00	0	0.0		0.00	0	0.0		0.00	1	2.5		0.02
Postelsia palmaeformis	71	15.6		2.22	277	13.9		7.69	1	12.5		0.13	8	7.5		0.20
TOTAL QUADRATS		32				36				8				40		

Table 40. Abundance of Intertidal Large Brown Algae found in ¼ m^2 Quadrats by Zone - Mendocino Power Plant Site - November 1971 through February 1973.

	Central Area								
	Zone A			Zone B			Zone C		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Laminaria setchellii	0	0.0	0.00	0	0.0	0.00	9	5.2	0.16
Costaria costata	0	0.0	0.00	0	0.0	0.00	35	15.5	0.60
Dictyoneurum californicum	0	0.0	0.00	0	0.0	0.00	159	6.9	2.74
Cystoseira osmundacea	0	0.0	0.00	3	3.7	0.04	21	10.3	0.36
Egregia menziesii	0	0.0	0.00	3	2.5	0.04	3	5.2	0.05
Alaria marginata	3	12.5	0.37	56	7.5	0.70	118	24.2	2.04
Postelsia palmaeformis	56	62.5	7.00	50	1.2	0.62	0	0.0	0.00
TOTAL QUADRATS		8			80			58	

Table 40. (cont.)

	North Control Area								
	Zone A			Zone B			Zone C		
	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean	Sum	Percent freq.	Mean
Desmarestia herbacea	0	0.0	0.00	0	0.0	0.00	1	2.0	0.02
Dictyoneurum californicum	0	0.0	0.00	0	0.0	0.00	49	5.9	0.96
Costaria costatum	0	0.0	0.00	1	2.6	0.03	7	9.8	0.14
Laminaria setchellii	0	0.0	0.00	12	5.1	0.31	1	2.0	0.02
Alaria marginata	0	0.0	0.00	8	7.7	0.20	20	11.8	0.39
Fucus distichus	1	3.8	0.04	0	0.0	0.00	0	0.0	0.00
Postelsia palmaeformis	352	42.3	13.54	5	7.7	0.13	0	0.0	0.00
TOTAL QUADRATS		26			39			51	

Discussion

The Point Arena intertidal does not possess as lush and diverse an assemblage of macroinvertebrates as one might expect of an open coast situation. Our data bears out a similar observation made by P. G. & E. consultant-biologist, Wheeler North, on a qualitative survey conducted during 1970 (Adams, et al. 1971). The reason for this is not clear, although possible unsuitability of siltstone substrate for many sessile organisms and/or harsh oceanic conditions that exist much of the year may limit invertebrate diversity.

For example, many animals which are normally encountered in northern California rocky intertidal situations have not been observed or are unexpectedly rare on the Point Arena coast. The hydroids *Abietinaria* and *Aglaophenia* were observed only rarely and usually common intertidal encrusting sponges were only seen occassionally. Bryozoans were also infrequent. Among the arthropods, most barnacle species were represented but were extremely patchy, especially the usually ubiquitous stalked barnacle, *Pollicipes polymerus*, which occurred in expected densities only in bench areas where there was appreciable seawater runoff. Adult crabs of the genera *Cancer* and *Pugettia* were found only rarely; however, juvenile *Pugettia* were frequently encountered among low growing red algae Other crabs, such as *Oedignathus*, *Haplogaster*, *Pachycheles* and *Petrolisthes* were common in crevices and under rocks, but due to their cryptic natures, were omitted from quantification. The California mussel, *Mytilus californianus*, although extremely common also occurred in less than expected densities, except in the situations where *Pollicipies* also occurred. *Pisaster ochraceous*, the common ochre star, probably limited by low abundances of its preferred prey, *Mytilus*, *Pollicipes* and *Balanus*

(Paine 1966) also was encountered infrequently in the transects. Barnacle eating snails, such as *Thais* and *Acanthina*, were also uncommon - again probably due to the infrequency of their prey. Usually common compound tunicates, such as *Amaroucium* and *Distaplia*, and the colonial solitary ascidian, *Clavelina huntsmani*, were not seen in the transects.

The reasons for the paucity of these elsewhere common intertidal invertebrates are not clear. However, comparison with a nearby area seems to indicate that harsh oceanic conditions are more limiting than is the possibility of unsuitable siltstone substrate for attaching organisms. Arena Rock, about 2.0 km (1.2 miles) north of the Point Arena lighthouse, rises from about 36 m (120 ft) of water to the surface on minus tides. A series of reconnaissance dives on the rock showed it to possess an extremely lush assemblage of invertebrates comprised of animals not found in the Point Arena nearshore subtidal. For example, one dive yielded a number of dead *Mytilus californianus*, (which had obviously been washed from the rock's often exposed peak) one with a shell length of 255 mm (10.2 inches). An animal this size indicates an old and stable population of mussels - a situation non-existant in the Point Arena intertida. That this siltstone rock, removed from the severe wave impact in the intertidal, can support large individuals and diverse populations seems to indicate that oceanic conditions, especially harsh winter storms, are indeed limiting on intertidal (and probably nearshore subtidal) invertebrate populations.

Our zonation scheme, like others, has its limitations since intertidal communities refuse to adhere strictly to the "boundaries" of zones. However, an animal's relative abundance from zone to zone indicates its distribution and possible relationship with other invertebrates and algae.

Concerning the intertidal communities of invertebrates and algae, it must be stressed that much of the data presented in this report represents organisms in a clinal situation. For example, a wide, flat intertidal bench area with a height of 1.0 m (3.3 ft) above MLLW will support different assemblages and abundances of invertebrates and algae on the seaward edge (or cline) of that bench than on the landward top of the bench. The communities on the seaward edge are almost invariably more diverse and abundant than communities removed a few meters from the edge even though the two communities exist in the same vertical life zone. This is due to the varying amounts of exposure the communities experience during the tidal cycle and is true for Zones A & B, and, to a much less extent, for Zone C. In the event future intertidal studies are performed at Point Arena, sampling must be conducted in those clinal areas to insure replicability of effort.

According to long-time residents of the Point Arena area, red abalone of sport legal size (shell length $\geq$ 177 mm) were once abundant in the Point Arean intertidal. Stories of once being able to obtain limits of abalone "without getting your feet wet" have been recounted to us by many local fishermen. This is no longer the case, possibly because Point Arena has been "discovered" and popularized by abalone fishermen from a wide area of California. A low tide weekend may attract a hundred or more abalone seekers to the Point Arena area. This fishing pressure may have served to reduce numbers of legal abalone in the intertidal where picking is physically easier.

Of 109 quarter-meter quadrats sampled in Zone C of the Central and North Control Areas, only four contained any red abalone-one apiece (Table 41). While

TABLE 41. Numbers of *Haliotis rufescens* Noted at or Near 30 m Intertidal Stations - Central and North Control Areas - Mendocino Power Plant Site - November, 1971 through February, 1973.

Area	Station	Numbers of *H. rufescens*	Location	Shell Lengths
North Control	43	1	Within one m of transect line.	175 mm
	35	1	Within quadrat.	No measure
	25	2	Within one m of transect line.	No measure
	41	14	One m below transect line.	Range from ∿ 125 mm to ∿ 165 mm
	49	15	One within quadrat and 14 within one m of transect line.	Six measured: 183, 178, 174, 155, 133 and 117 mm Smallest noted ≧ 100 mm
Central	9	1	Within quadrat.	∿ 75 mm
	32	5	Within one m of transect line.	Four measured: 167, 166, 160 and 83 mm
	38	13	Within one m of transect line.	Six measured: 200, 179, 155, 148, 141 and 120 mm
	50	12	Within five m of transect line.	One > 177 mm, eleven < 177 mm
	26	3	Within one m of transect line.	157, 143 and > 177 mm (5 others, all legal, noted within 5 m of transect).
	33	1	Within quadrat.	35 mm

abalone occurred at, or in the vicinity of 11 of the 33 stations studied in Zone C, only six of 57 abalone whose shell lengths were measured or estimated were of sport legal size.

While the usually rigorous environment of the nearshore region probably exerts a naturally limiting effect on intertidal abalone populations, access to the intertidal is also a factor in limiting numbers of sport legal size abalone. Stations 41 and 49 in the North Control Area, where the highest numbers of abalone were observed, not only benefit from the protection of a sheltered cove but are also restricted from the public by the boundaries of a privately owned ranch. Station 38 in the Central Area, where higher numbers of abalone were also found, is accessible only by walking a mile over rough intertidal terrain. Public access is generally possible at stations 11 through 34 in the North Control Area and stations 29 through 62 in the Central Area. Stations 1 through 10 in the North Control Area and 1 through 14 in the Central Area reportedly receive high abalone utilization by the personnel of the Coast Guard Reservations which border these two areas.

FISHES

Prepared by Robert N. Lea

In this report fishes as a group of organisms are separated into three categories; intertidal, subtidal, and diver-observed fishes. Intertidal and subtidal fishes were collected by use of the ichthyocide, Chem Fish Collector, and were identified and analyzed in the laboratory. Although there is some overlap between these two categories, the assemblages are quite different and are essentially independent. There is probably little interaction between the fishes of these two communities.

Diver-observed fishes included forms that were seen while working at underwater stations or during reconnaisance dives as well as those species that were noted, but not affected, at the five subtidal ichthyocide stations. These were either fishes that were high up in the water column, and thus avoided contact with the Chem Fish, or predatory fishes that moved in to feed on the smaller forms that were stressed. It was often impossible to identify to species level small fishes such as cottids and stichaeids, hence, the ichthyocide stations greatly supplemented our knowledge of the fish fauna of the Mendocino study area. Also, many of the small forms are extremely cryptic and are never, or seldom, seen by divers.

Intertidal Fishes

During the study, a total of 27 intertidal ichthyocide stations was completed (Table 42). Eleven families and 36 species of fishes were represented in these collections. Five taxa were not identified to species level, either due to their small size and/or lack of taxonomic

keys to juvenile forms. The families of intertidal fishes represented were Cebidichthyidae, Clinidae, Cottidae, Embiotocidae, Gobiesocidae, Hexagrammidae, Liparididae, Pholididae, Scorpaenidae, Scytalinidae, and Stichaeidae.

Collection sites varied from small urchin dominated pot-holes to relatively large surge channels and from water levels as high as 1.2 m (+4.0 ft) above zero to sills at 0.6 m(-2.0 ft) below zero. The number of species taken during collections varied from one (an atypical collection - 2 cottids) to 23. The mean number of species per station was 11.44.

An annotated listing of the 14 most important species, as determined by an index of abundance (Index = number collected X frequency of occurrence) is given (Table 42). Notes on several other species considered as important but with a low index value are included.

1. *Xiphister atropurpureus* - Black prickleback.

The black prickleback was the most numerous species taken, but second in terms of frequency of occurrence. This fish was taken at all levels of the intertidal where suitable habitat was present, rocky substrate with adequate algal cover. *Xiphister atropurpureus* co-occurred with its only congener, *X. mucosus*, at 13 stations (48%), indicating a similar niche preference for these two morphologically similar species. *Xiphister atropurpureus* is possibly adapted for smaller pools and has a lesser space requirement than *X. mucosus*. By size, it reaches approximately one-half the length of *X. mucosus*.

2. *Oligocottus snyderi* -- Fluffy sculpin.

This cottid was the most frequently encountered species (93%), but second numerically. Its presence in the intertidal should be considered as ubiquitous. It often occurred in relatively large numbers, even in small pools. An individual 91.6 mm (3.7 inches) TI, collected on December 4, 1972, is the largest known example of this species.

3. *Xiphister mucosus* - Rock prickleback.

This species is an extremely important intertidal form and represents the largest herbivorous fish commonly encountered at the Mendocino study area. We are able to distinguish between *X. mucosus* and *X. atropurpureus* as small as 20 mm (0.8 inch) TL, however, identification to species level below this is extremely difficult. The largest collection of *X. mucosus* was made in a surge channel with much undercutting. This species appears to feed heavily on red algae.

4. *Oligocottus maculosus* - Tidepool sculpin.

Although third numerically, the tidepool sculpin was taken less frequently than such fishes as *Anoplarchus purpurescens*, *Clinocottus globiceps*, *Oligocottus snyderi*, and the two *Xiphister* species. Its high ranking is partially the reflection of two large collections (254 and 128 specimens).

5. *Anoplarchus purpurescens* - High cockscomb.

This stichaeid was taken in large numbers only twice (39 and 38 specimens), hence, its importance is more a reflection of the frequency with which it occurred (f=17). This species is easily distinguishable from all other California intertidal stichaeids. It is often taken from pools containing articulated coralline algae; this floral type perhaps providing a niche for the high cockscomb.

6. *Gobiesox maeandricus* - Northern clingfish.

The northern clingfish was seldom taken in large numbers, the modal number being 3.5 for the 15 stations at which it occurred. However, on August 16, 1972, one hundred specimens were collected from a relatively small surge channel, the vast majority being juveniles of between 12.7 to 15.0 mm (0.51-0.6 inch) SL. The importance of this species as an indicator organism should be considered from the standpoint of its presence or absence with a lesser concern for number collected per station.

7. *Liparis florae* - Tidepool snailfish.

As with the previously mentioned species, the tidepool snailfish has adapted to intertidal life through modification of the pelvic fin structure to create an attaching disc for adherence to substrate.

8. *Xererpes fucorum* - Rockweed gunnel.

The rockweed gunnel was collected at ten stations with 121 specimens taken. Two large collections (60 and 18) may have skewed the relative importance of this species to some degree, however, this species and another pholidid, *Apodichthys flavidus*, are both important intertidal fishes.

9. *Artedius lateralis* - Smoothhead sculpin

This species occurred with a rather high frequency (52%) but only twice was it collected in quantity (18 and 13). It most often occurred in collections at or below the zero tide level.

10. *Apodichthys flavidus* - Penpoint gunnel.

The penpoint gunnel, along with the aforementioned *Xererpes fucorum*, were found most often in pools containing surf grass, *Phylospadix*. The penpoint gunnel occurred in 13 collections, three containing large numbers of individuals (22, 21, and 15). *Apodichthys flavidus* and *Xererpes fucorum*, although morphologically similar, were easily distinguished at approximately 15 mm (0.6 inch) SL based on the structure of the anal spine.

11. *Clinocottus globiceps* - Mosshead sculpin.

This sculpin occurred with high frequency in the intertidal (67%), especially in the higher tidal zone, with our largest collections coming from pools above the 0.6 m (+2.0 ft) tidal level. Thirteen specimens of a congener, *C. recalvus*, were taken at a single station. These two species are impossible to distinguish at a size less than 35 mm (1.4 inches) SL and, hence, all larval and juvenile specimens of this group were considered as a *Clinocottus globiceps-recalvus* complex.

12. *Sebastes melanops* - Black rockfish.

Large tidepools may act as an important nursery area for juvenile black rockfish. This scorpaenid was taken on 13 occasions (48%), while the blue rockfish, *Sebastes mystinus*, was collected in only four instances (15%). This differential may be due to competitive exclusion, or simply to the fact that the black rockfish is much more abundant along this section of California coastline. Only young-of-the-year fish (of both species) have been taken in the intertidal. Larger and older individuals move into the subtidal where they were commonly observed by our divers.

13. *Hexagrammos decagrammus* - Kelp greenling.

The kelp greenling appears to utilize the intertidal environment during its early life history. However, this species may not be an obligatory resident as small individulas were commonly noted in the subtidal by our divers. This species and the rock greenling, *H. superciliosusm* were the only two hexagrammids taken in intertidal collections.

14. *Scorpaenichthys marmoratus* - Cabezon.

Sixty specimens were taken at 13 stations (48%). These specimens ranged from 31.7 to 267.3 mm (1.3-10.7 inches) SL, with the majority less than 100 mm (4.0 inches) SL. The cabezon spends its early life history in larger tide pools after a pelagic existence. Those individuals larger than 100 mm (4.0 inches) SL, taken from the intertidal, were from relatively large pools or surge channels. Due to its somewhat unique life history pattern, this fish should be considered as an important indicator species.

Other species:

Of the remaining 22 species, many can be considered as inhabitants of the lower intertidal, hence most were taken irregularly.

Cottid fishes of the *Clinocottus globiceps-recalvus* complex were juvenile specimens less than 35 mm (1.4 inches) SL. Precise identification is impossible between these two species below this size and the majority of specimens from this complex in all probability belong to *Clinocottus*

TABLE 42. Intertidal Fishes Ranked by Index of Abundance - Mendocino Power Plant Site -

Rank	Species	Index
1	*Xiphister atropurpureus*	19,895
2	*Oligocottus snyderi*	18,275
3	*Xiphister mucosus*	10,914
4	*Oligocottus maculosus*	8,096
5	*Anoplarchus purpurescens*	2.754
6	*Gobiesox maeandricus*	2,505
7	*Liparis florae*	1,216
8	*Xererpes fucorum*	1,210
9	*Artedius lateralis*	1,176
10	*Apodichthys flavidus*	1,170
11	*Clinocottus globiceps*	1,116
12	*Sebastes melanops*	988
13	*Hexagrammos decagrammus*	910
14	*Scorpaenichthys marmoratus*	780
15	COTTIDAE	600
16	*C. Globiceps-recalvus* complex	588
17	*Ascelichthys rhodorus*	296
18	*Hemilepidotus spinosus*	232
19	*Hexagrammos superciliosus*	171
20	*Oligocottus rubellio*	168
21	*Clinocottus analis*	150
22	*Gibbonsia montereyensis*	130

TABLE 42 (cont.)

Rank	Species	Index
23	*Sebastes mystinus*	120
24	*Oligocottus rimensis*	112
25	*Xiphister* spp.	102
26	*Clinocottus embryum*	78
27	*Artedius harringtoni*	30
28	*Scytalina cerdale*	22
29	*Liparis rutteri*	18
30	*Phytichthys chirus*	16
31	STICHAEIDAE	15
32	*Embiotoca lateralis*	14
33	*Clinocottus recalvus*	13
34	*Gibbonsia metzi*	12
35	*Cebidichthys violaceus*	6
36	*Sebastes rastrelliger*	6
37	*Enophrys bison*	4
38	*Clinocottus acuticeps*	2
38	*Sebastes* spp.	2
39	*Liparis fucensis*	1
39	*Sebastes flavidus*	1

globiceps, the mosshead sculpin.

Ascelichthys rhodorus, the rosylip sculpin, considered an uncommon California fish was taken at eight collection sites (34%) and may not be as uncommon as previously suspected given the correct environmental habitat.

Scytalina cerdale, the graveldiver, although taken on only two occasions may be more abundant than our data indicate. This fish is difficult to collect, and was observed to burrow in the substrate after an application of ichthyocide (most species swim to the surface). The graveldiver also has very specific habitat requirement; gravel and cobble bottom of rather specific size.

Sebastes rastrelliger, the grass rockfish, although collected only twice, would be expected from the lower intertidal and was a species taken with some regularity by anglers fishing in this zone.

Subtidal Fishes

Six subtidal fish collecting stations ranging from 7.9 to 15.3 m (26.1-50.1 ft) in depth were completed during our study (Table 43). The numbers of fish taken per station were 15, 265, 531, 12, 24 and 75 - the species number per station ranged from 5 to 28. Thirty-eight species of fishes were collected with three of these being taken in all six collections (*Artedius harringtoni*, *Hemilepidotus spinosus*, and *Liparis fucensis*). Conversely, 16 species were taken at only one site perhaps indicating that additional subtidal collecting would yield more species. Secondly, the dominance of a few species is indicated. Cottid fishes were the dominate group with 13

species represented from this family; numerically, 587 of the 922 sublittoral fishes were cottids (64%). Other important sublittoral families included: Agonidae, four species and 16 specimens; Liparididae, four species and 128 specimens; Scorpaenidae, five species and 49 specimens; Stichaeidae, three species and 101 specimens.

The seven most common species of sublittoral fishes are discussed below:

1. *Hemilepidotus spinosus* - Brown Irish lord.

A total of 232 brown Irish lord was taken. This fish was the dominant species taken in four of the six collections, being second in the other two collections. The brown Irish lord occurs occasionally in the low intertidal, but is not a true part of that faunal assemblage. Its congener, *H. hemilepidotus*, the red Irish lord, was not taken at any of our sublittoral collecting sites although a single specimen of approximately 250 mm (10 inches) TL was collected by one of our divers during a reconnaissance survey. The absence of the red Irish lord from our ichthyocide collections cannot be explained; however, it would be predicted that this species would be taken if additional collections were made.

2. *Artedius harringtoni* - Scalyhead sculpin.

Second numerically, this cottid also occurred at all six stations. Although the total number of *A. harringtoni* was very close to *H. spinosus* (229 vs. 232), the large collections of this form from two stations (102 and 109) may slightly skew the relative importance of the scalyhead sculpin. Certainly though, it must be considered as one of the sublittoral fishes of major importance. As with *H. spinosus*, *A. harringtoni* is occasionally taken from the low intertidal, however, neither of these fishes are truly intertidal forms. This cottid is probably one of the sculpins commonly observed by our divers which are recorded as "*Artedius*-type cottid", its

small size and superficial similarity to other cottids precluding positive underwater identification. When collected, the orangish coloration of the branchiostegal region on this beautiful fish provides an excellent character for field identification.

3. *Liparis fucensis* - Slipskin snailfish

Of four species of snailfishes collected, *L. fucensis* was the only common sublittoral form. The other three species, *L. florae*, tidepool snailfish; *L. mucosus*, slimy snailfish; and *L. rutteri*, ringtail snailfish, occurred in low numbers; however, *L. mucosus* was taken at three stations (50%). Ecologically, *L. florae* is a form adapted to intertidal life, while *L. fucensis* and *L. mucosus* are certainly sublittoral species. The status of *L. rutteri* is uncertain but its absence from sublittoral collections and its occurrence from two intertidal sites would indicate it to be an uncommon element of the intertidal fauna. The largest collection of *L. fucensis* was made at a site in which sand composed a substantial part of the substrate.

4. *Chirolophis nugator* - Mosshead warbonnet

The mosshead warbonnet was the most important of four species of stichaeid fishes from the sublittoral. This species was not collected from the intertidal and would not be expected from that zone in the Point Arena area. As with *L. fucensis*, the slipskin snailfish, the greatest collection of *C. nugator* was from the station with sand substrate. However, the distinctive pattern and coloration of this species would suggest that it occurs in algae covered or invertebrate encrusted substrate.

TABLE 43. Fishes Collected at Six Subtidal Stations. Mendocino Power Plant Site. March 1972 through April 1973.

Species	Sum	Freq.	Index	Size Range mmSL
AGONIDAE - α	1	1	1	26.5
Ammodytes hexapterus	6	1	6	89.8 - 99.4
Anoplagonus inermis	1	1	1	38.1
Anoplarchus sp.	32	3	96	21.4 - 90.1
Artedius corallinus	3	2	6	23.3 - 59.4
Artedius corallinus-lateralis complex	3	1	3	10.2 - 19.6
Artedius fenestralis	26	4	104	18.7 - 51.9
Artedius harringtoni	229	6	1374	13.1 - 63.8
Artedius lateralis	1	1	1	26.1
Ascelichthys rhodorus	15	3	45	20.2 - 78.2
Bothragonus swanii	13	2	26	20.8 - 49.9
Chilara taylori	3	1	3	86.7 - 95.6
Chirolophis nugator	67	4	268	28.9 - 97.1
Citharichthys stigmaeus	10	1	10	36.3 - 99.6
Coryphopterus nicholsii	1	1	1	26.1
COTTIDAE - β	9	4	36	15.5 - 32.0
Enophrys bison	14	3	42	12.0 -215.0
Gobiesox maeandricus	2	1	2	65.1 - 70.1
Hemilepidotus spinosus	232	6	1392	23.0 -146.5
Hexagrammos decagrammus	11	4	44	75.0 -189.0
Jordania zonope	29	4	116	41.3 - 81.8
Liparis florae	7	2	14	31.8 - 96.8

TABLE 43 (cont.)

Species	Sum	Freq.	Index	Size Range mmSL
Liparis fucensis	99	6	594	18.0 - 78.8
Liparis mucosus	9	3	27	14.4 - 51.5
Liparis rutteri	1	1	1	22.6
Liparis spp.	8	2	16	9.9 - 22.5
Nautichthys oculofasciatus	3	1	3	25.3 - 52.9
Oxylebius pictus	2	1	2	48.0 - 57.0
Pallasina barbata aix	1	1	1	52.3
Pholis schultzi	10	2	20	34.1 - 47.1
Phytichthys chirus	2	1	2	34.9 - 82.6
Rhamphocottus richardsoni	5	3	15	20.5 - 37.0
Scorpaenichthys marmoratus	11	3	33	35.8 -224.0
Sebastes chrysomelas	1	1	1	58.4
Sebastes flavidus	15	2	30	48.6 - 61.0
Sebastes melanops	8	2	16	37.3 -121.3
Sebastes mystinus	23	3	69	50.5 -114.8
Sebastes pinniger	2	1	2	40.1 - 48.1
Synchirus gilli	7	1	7	27.5 - 41.9

AGONIDAE - α : This specimen is currently being analyzed and may represent an undescribed species.

COTTIDAE - β : These nine specimens represent a species new to the California marine ichthyofauna.

5. *Jordania zonope* - Longfin sculpin

This cottid occurred at four stations. At two sites it constituted a substantial part of the collections; 10 of 24 specimens (42%) and 12 of 75 specimens (16%). The distinctively colored longfin sculpin was observed by divers on several occasions.

6. *Artedius fenestralis* - Padded sculpin

This species, along with *Artedius harringtoni*, the scalyhead sculpin, is one of the small cottids commonly observed by our divers and categorized as "*Artedius*-type cottid". Although taken in relatively small numbers, the padded sculpin occurred at four stations (67%). A closely related cottid, *Artedius notospilotus*, the bonyhead sculpin, was not collected, although it would be expected from the study area.

7. *Anoplarchus* sp. - Cockscomb

Anoplarchus purpurescens, the high cockscomb, is a common member of the intertidal fauna and the occurrence of a relatively large number of *Anoplarchus* (28 of 531 specimens or 5%) from one of our deeper collections is of interest. These subtidal *Anoplarchus* have been compared with the intertidal *A. purpurescens* and morphological differences have been noted.

Diver-Observed Fishes

Approximately 40 species of fishes were observed during diving operations at the Mendocino study area (Tables 44 & 45). It should be realized that certain difficulties are inherent in attempting to identify fishes underwater. Although such forms as the cabezon, lingcod, and kelp greenling are quite easily recognized, a number of other forms are not so readily distinguished. Many of the rockfishes, *Sebastes* spp., are quite similar and

TABLE 44. Diver Observed Fishes - Mendocino Power Plant Site - September 1971 through December 1972.

Species	Periods:	Presurvey	Central Area Davidson	Central Area Upwelling	Central Area Oceanic	North Control Area Davidson	North Control Area Upwelling	North Control Area Oceanic
Anarrhichthys ocellatus				X				
Artedius corallinus				X				
Artedius fenestralis					X			
Artedius spp.		X	X	X	X	X	X	
Ascelichthys rhodorus (?)			X					
Aulorhynchus flavidus					X			
Chirolophis nugator		X			X		X	
Citharichthys sp.			X		X			
Clupea harengus pallasi				X				NO
Coryphopterus nicholsii		X		X				
COTTIDAE		X	X	X	X	X	X	
Damalichthys vacca		X		X	X			
EMBIOTOCIDAE		X						
Embiotoca lateralis		X	X	X	X		X	
Enophrys bison		X		X				DIVES
Gibbonsia sp.		X		X			X	
Gobiesox maeandricus							X	
GOBIIDAE				X				
Hexagrammos decagrammus		X	X	X	X	X	X	
Hexagrammos superciliosus		X		X		X	X	
HEXAGRAMMIDAE				X				
Hyperprosopon anale			X					
Hyperprosopon argenteum				X				
Jordania zonope			X		X		X	
Liparis florae							X	
Liparis sp.							X	
Ophiodon elongatus		X	X	X	X	X	X	
Oxylebius pictus		X	X	X			X	
Rhacochilus toxotes		X		X				
Scorpaenichthys marmoratus		X	X	X	X	X	X	
Sebastes carnatus				X				
Sebastes caurinus		X		X	X			
Sebastes chrysomelas		X		X	X			
Sebastes flavidus-serranoides complex, juveniles				X	X		X	
Sebastes maliger		X						
Sebastes melanops		X		X	X	X	X	
Sebastes miniatus		X		X				
Sebastes mystinus		X	X	X	X	X	X	
Sebastes nebulosus		X		X			X	
Sebastes pinniger		X						
Sebastes rastrelliger				X				
STICHAEIDAE (?) called "Blenny"				X			X	
Synchirus gilli					X			

Dates: Presurvey - September 1971
Davidson - January - March 1972
Upwelling - May-August 1972
Oceanic - September-November 1972

TABLE 45. Percent Frequency of Occurrence of Some Diver Observed Fishes by Depth and Oceanographic Period* -Mendocino Power Plant Site - September 1971 through November 1972.

Scientific Name	Davidson			Upwelling			Oceanic			Totals		
Depth Zones**	I	II	III	I	II	III	I	II	III	I	II	III
ANARHICHADIDAE												
Anarrhichthys ocellatus	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	2.7	0.0
BOTHIDAE												
Unidentified	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	16.7	3.7	0.0	5.3
CLUPEIDAE												
Clupea harengus pallasii	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	2.7	0.0
COTTIDAE												
Enophrys bison	0.0	0.0	0.0	6.7	5.3	0.0	16.7	0.0	0.0	7.4	2.7	0.0
Jordania zonope	0.0	20.0	0.0	0.0	15.8	0.0	16.7	23.1	16.7	3.7	18.9	5.3
Scorpaenichthys marmoratus	0.0	60.0	0.0	46.7	36.8	27.3	16.7	38.5	16.7	29.6	40.5	21.0
Synchirus gilli	0.0	0.0	0.0	0.0	0.0	0.0	16.7	23.1	0.0	3.7	8.1	0.0
Unidentified	0.0	80.0	100.0	20.0	26.3	45.4	33.3	46.1	16.7	18.5	40.5	42.1
EMBIOTOCIDAE												
Damalichthys vacca	0.0	0.0	0.0	6.7	10.5	9.1	33.3	23.1	0.0	11.1	13.5	5.3
Embiotoca lateralis	100.0	0.0	0.0	20.0	15.8	0.0	50.0	30.8	50.0	25.9	18.9	15.8
Hyperprosopon argenteum	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0
Rhacochilus toxotes	0.0	0.0	0.0	6.7	0.0	0.0	16.7	0.0	0.0	7.4	0.0	0.0
GASTEROSTEIDAE												
Aulorhynchus flavidus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	2.7	0.0

TABLE 45 (cont.)

Scientific Name	Davidson			Upwelling			Oceanic			Totals		
Depth Zones**	I	II	III	I	II	III	I	II	III	I	II	III
GOBIESOCIDAE												
Unidentified	0.0	0.0	0.0	0.0	15.8	0.0	0.0	0.0	0.0	0.0	8.1	0.0
GOBIIDAE												
Coryphopterus nicholsii	0.0	0.0	0.0	0.0	0.0	9.1	16.7	0.0	16.7	3.7	0.0	10.5
Unidentified	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	5.3
HEXAGRAMMIDAE												
Hexagrammos decagrammus	100.0	60.0	50.0	66.7	63.2	90.9	83.3	76.9	83.3	59.2	67.5	84.2
Hexagrammos superciliosus	0.0	20.0	0.0	0.0	10.5	0.0	16.7	15.4	0.0	3.7	13.5	0.0
Ophiodon elongatus	0.0	40.0	0.0	20.0	26.3	45.4	33.3	38.5	83.3	18.5	32.4	52.6
Oxylebius pictus	0.0	20.0	0.0	6.7	5.3	9.1	0.0	15.4	16.7	3.7	10.8	10.5
LIPARIDIDAE												
Unidentified	0.0	0.0	0.0	0.0	10.5	0.0	0.0	0.0	0.0	0.0	5.4	0.0
SCORPAENIDAE												
Sebastes carnatus	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	2.7	0.0
Sebastes caurinus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	33.3	0.0	2.7	10.5
Sebastes chrysomelas	0.0	0.0	0.0	0.0	5.3	0.0	16.7	0.0	0.0	3.7	2.7	0.0
Sebastes maliger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	5.3
Sebastes melanops	0.0	20.0	0.0	40.0	57.9	45.4	33.3	61.5	66.7	29.6	54.0	47.4
Sebastes miniatus	0.0	0.0	0.0	0.0	0.0	9.1	0.0	7.7	0.0	0.0	2.7	5.3
Sebastes mystinus	100.0	60.0	50.0	46.7	57.9	90.9	83.3	76.9	100.0	48.1	64.9	89.5
Sebastes nebulosus	0.0	0.0	0.0	0.0	5.3	18.2	0.0	7.7	33.3	0.0	5.4	21.0
Sebastes pinniger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	5.3
Sebastes rastrelliger	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0
Unidentified	0.0	0.0	0.0	20.0	10.5	0.0	16.7	15.4	0.0	14.8	10.8	0.0

TABLE 45 (cont.)

Scientific Name	Davidson			Upwelling			Oceanic			Totals		
Depth Zones **	I	II	III	I	II	III	I	II	III	I	II	III
STICHAEIDAE												
Chirolophis nugator	0.0	0.0	0.0	0.0	5.3	0.0	0.0	15.4	0.0	0.0	8.1	0.0
Unidentified	0.0	0.0	0.0	13.3	10.5	9.1	0.0	7.7	0.0	7.4	8.1	5.3
TOTAL STATIONS	1	5	2	15	19	11	6	13	6	27	37	19

* Both study areas combined.

** Depth Zones

I = 2.4 - 7.6 m
II = 7.9 -15.2 m
III =15.6 -22.9 m

exact identification is only possible if the diver can observe the fish closely, particularly juveniles, noting either a characteristic behavorial pattern or distinctive coloration. Cottids and blenny-type fishes (Stichaeidae and Pholididae) are often impossible to identify underwater and their positive determination is only possible after microscopic examination. Generally the divers encountered more fish during the Upwelling and Oceanic Periods (Table 45).

Thirteen families are represented as diver-observed fishes: Anarhichadidae, Bothidae, Clinidae, Clupeidae, Cottidae, Embiotocidae, Gasterosteidae, Gobiesocidae, Gobiidae, Hexagrammidae, Liparididae, Scorpaenidae, and Stichaeidae. Of these, four families contain species which are considered as commonly observed. These fishes are referred to as "macro-fishes" due to their large size relative to the total fish population in the sublittoral community. The four primary diver-observed families are considered below:

Cottidae. Numerous small cottids were encountered during our underwater surveys; the majority identified only as "undetermined cottid" or "*Artedius*-type". As indicated above, it is impossible to positively identify small forms unless they are collected and examined microscopically. Two small, distinctive forms were encountered which cannot be confused with other species; *Jordania zonope*, the longfin sculpin, was noted several times and *Synchirus gilli*, the manacled sculpin, was observed on *Nereocystis* stipes on several occasions. Of the large cottids, two large species were observed.

1. *Enophrys bison* - the buffalo sculpin.

A cottid which reaches 36.5 cm (14.6 inches), although a very cryptic form was noted several times. It was usually completely exposed, resting on the

siltstone substrate, apparently depending upon its shape and coloration for protection. Most were observed in shallow depths of 2.4 - 7.6 m (7.9-25.1 ft).

2. *Scorpaenichthys marmoratus* - cabezon.

Cabezon were commonly observed and should be considered as one of the important sublittoral fishes. They were an omnipresent species, although not seen in large numbers. Only adult cabezon were observed, with some individuals probably weighing in excess of ten pounds. Cabezon were commonest in mid-depths of 7.9 - 15.2 m (26.1-50.1 ft).

Embiotocidae. Five species of surfperches were observed, but only the striped surfperch, *Embiotoca lateralis*, and the pile surfperch, *Damalichthys vacca*, were noted consistently. The former was the more common species. Surfperches were seen primarily in kelp beds, occurring up in the water column. Surfperch were most often observed in the cove in shallow water.

Hexagrammidae. Four species of hexagrammids were noted: lingcod, *Ophiodon elongatus;* kelp greenling, *Hexagrammos decagrammus;* rock greenling, *Hexagrammos superciliosus*; and the painted greenling, *Oxylebius pictus*. With the exception of the painted greenling, the other species are important to the sportfishery. The lingcod and kelp greenling were commonly encountered during our underwater surveys. The rock greenling, not observed with regularity, is more common in the shallow sublittoral. The lingcod and kelp greenling were often observed in pairs and threes; both species were more frequently observed at mid-depth and deep stations (Table 45). The rock greenling, when seen, was almost always solitary.

Scorpaenidae. Eleven species of rockfishes, genus *Sebastes*, were observed, three commonly: the blue rockfish, *Sebastes mystinus*, black

rockfish, *Sebastes melanops*; and rockfishes of the yellowtail-olive group, *Sebastes flavidus-serranoides* complex. Blue and black rockfishes were often noted in relatively large numbers with both juveniles and adults occurring. For the most part, fishes of similar size groups schooled together. Juveniles were often associated with the bottom while adults occupied positions throughout the water column. It was impossible to distinguish between juvenile yellowtail and olive rockfishes underwater, hence, these two species are treated as a complex. *Sebastes carnatus*, *S. chrysomelas*, *S. nebulosus*, *S. maliger*, and *S. rastrelliger* are basically solitary, bottom-dwelling species and were noted much less frequently than the schooling types. *Sebastes miniatus* and *S. pinniger*, known collectively as "red rockfish" by anglers, were observed several times. These two species are referred to as "bottom-type" fishes, however, we have always noted them as occurring from several to possibly 3 m (10 ft) off the bottom. Rockfishes in general are an extremely important component of the sublittoral environment and fishes of this group would be expected to be encountered during any dive at the Mendocino Power Plant site.

FOOD HABIT STUDIES OF SELECTED FISH

Prepared by Gary D. Farrens and Daniel W. Gotshall

Preliminary fish food habit studies in the Point Arena Area (Gotshall et al 1972) indicated the possibility of using some fish as biological samplers and to determine food webs. Therefore, studies were expanded to 14 of the more abundant carnivorous fish species.

Methods

Stomachs of fishes collected from the skiff and party boat fishery and Chem-Fish collections in the Point Arena Cove area were used in the

study. Each fish was identified and its standard length, total length, weight, sex, date and location of capture recorded. The stomachs were then removed and preserved in 10% formalin or 70% isopropyl alcohol. Stomach contents were examined under a dissecting microscope and then transferred to 40% isopropyl alcohol for permanent storage. The organisms were measured, counted, and volume of displacement determined in a graduated cylinder. Organisms found in the mouths and throats of the fish were discarded.

Results

Rockfish

Copper rockfish - *Sebastes caurinus.* Of 35 copper rockfish stomachs collected, six were empty (Table 46) but the others contained 17 different types of animals. The three most frequently observed were *Octopus apollyon*, crabs (mostly *Cancer oregonensis*), and unidentified fish. It is interesting to note that we rarely observed either the octopus or the crab in subtidal surveys, because both are very cryptic; thus, the copper rockfish may serve as a biological sampler for these animals.

Black rockfish - *Sebastes melanops.* Thirteen stomachs were examined and four were empty (Table 47). The stomachs contained at least seven different types of animals. Salps, *Salpa* sp., were most frequently observed animals and made up most of the volume.

Grass rockfish - *Sebastes rastrelliger.* This fish is one of the most important large predators found in the shallow waters (intertidal to 7.6 m (25 ft) in Point Arena Cove. We have collected and examined nine stomachs, two of which were empty (Table 48). *Loxorhynchus crispatus*,

TABLE 46. Frequency of Occurrence, Number and Volume of 18 Food Items in Copper Rockfish Stomachs - Mendocino Power Plant Site - 1972.

Food Item	Number of stomachs containing item	Number of items	Volume (ml)
MOLLUSCA			
Calliostoma sp.	1	1	0.5
Loligo opalescens+	4	4	44.0
Octopus apollyon	10	14	48.5
ARTHROPODA			
Cancer oregonensis	9	21	48.5
Cancer sp.	5	6	90.0
Crago sp.	1	2	2.0
Pandalus danae	1	2	12.0
Petrolisthes eriomerus	1	1	1.0
Spirontocaris brevirostrus	1	1	2.0
Unidentified crab	3	3	1.5
Unidentified Mysidae	2	4	TR
Unidentified shrimp	5	6	5.0
ECTOPROCTA			
Unidentified	2	NC	1.0
CHORDATA			
Engraulis mordax+	3	9	99.0
Hemilepidotus spinosus	1	1	8.0
Sebastes sp.	3	5	4.5
Unidentified fish*	6	7	9.5

TABLE 46. (cont.)

Food Item	Number of stomachs containing item	Number of items	Volume (ml)
MISCELLANEOUS		NC	11.0
TOTAL NUMBER OF STOMACHS EXAMINED	35		
NUMBER EMPTY	6		

\+ Some of these may be bait.
* Several stomachs contained only otiliths or other bones, resulting in a lower total volume than would be expected.
NC Not countable.

TABLE 47. Frequency of Occurrence, Number and Volume of Eight Food Items in Black Rockfish Stomachs - Mendocino Power Plant Site - 1972.

Food Item	Number of stomachs containing item	Number of items	Volume (ml)
ANNELIDA			
Unidentified polychaet	1	1	1.0
ARTHROPODA			
*Cancer magister**	3	7	1.5
Unidentified amphipod	6	42	1.7
Unidentified crustacean material	1	1	0.5
Unidentified isopod	1	1	<0.5
Unidentified shrimp	1	1	0.5
CHORDATA			
Sebastes sp.	4	10	0.5
Unidentified salps	7	NC	71.5
MISCELLANEOUS	2	NC	1.0
TOTAL NUMBER OF STOMACHS EXAMINED	13		
NUMBER EMPTY	4		

* megalops

NC-not countable

TABLE 48. Frequency of Occurrence, Number and Volume of Six Food Items in Grass Rockfish Stomachs - Mendocino Power Plant Site - 1972.

Food Item	Number of stomachs containing item	Number of items	Volume (ml)
MOLLUSCA			
*Loligo opalescens**	1	1	2.5
ARTHROPODA			
Cancer productus	1	1	1.0
Loxorhynchus crispatus	2	4	24.0
Unidentified barnacle	1	1	0.25
Unidentified decapod	2	2	0.5
CHORDATA			
Sebastes sp.	2	9	7.0
Xiphister mucosus	1	1	12.0
Unidentified fish	2	2	7.5
MISCELLANEOUS	1	NC	1.5
TOTAL NUMBER OF STOMACHS EXAMINED	9		
NUMBER EMPTY	2		

*Probably bait

the masking crab, contributed the highest volume, 24.0 ml, while juvenile rockfish, *Sebastes* spp. were the most frequently observed food item.

Miscellaneous rockfish. A few stomachs have been collected from gopher rockfish (1), yellowtail rockfish, *S. flavidus* (1); quillback rockfish, *S. maliger* (1); canary rockfish, *S. pinniger* (2); and olive rockfish, *S. serranoides* (1) (Table 49). Decapod material was the most common food item in all, except for the olive rockfish, which contained two fish genera, the Pacific sand lance, *Ammodytes hexapterus*; and *Sebastes* spp. *Ammodytes* sp. contributed the largest volume, 17 ml, and *Sebastes* spp. was the most frequently observed food item in the olive rockfish stomachs. The single quillback rockfish stomach examined contained one unidentified shrimp and seven nematodes, which were probably parasites. *Cancer oregonensis* contributed the highest volume and the largest number of individuals in the gopher rockfish stomach examined. Both canary rockfish stomachs collected were empty. The yellowtail rockfish examined contained one euphausid and one mysid, but unidentified crustacean material contributed the largest volume.

Cottids.

Cabezon - *Scorpaenichthys marmoratus*. All 14 of the cabezon stomachs examined contained food; 22 types of animals were identified (Table 50). *Cancer* crabs contributed the largest volume, 99.5 ml, and were the most frequently observed organisms. The largest number of any one species observed was the octopus, *Octopus apollyon*.

Brown Irish lord - *Hemilepidotus spinosus*. Twenty-nine brown Irish lord stomachs were examined, one of which was empty (Table 51). Eighteen

TABLE 49. Frequency of Occurrence, Number and Volume of Food Items in Five Species of Rockfish Stomachs - Mendocino Power Plant Site - 1972-73.

Rockfish	Food item	Number of stomachs containing item	Number of items	Volume (ml)
Gopher rockfish	*Cancer oregonensis*	1	2	2.0
	Cancer sp.	1	1	0.5
	Unidentified cottid or agonid	1	1	1.0
	Unidentified polychaet	1	1	<0.5
	Total number of stomachs examined	1		
	Number empty	0		
Yellowtail rockfish	Unidentified euphausid	1	1	<0.5
	Unidentified mysid	1	1	<0.5
	Unidentified crustacean material	1	-	1.0
	Total number of stomachs examined	1		
	Number empty	0		
Quillback rockfish	Unidentified nematodes	1	7	-
	Unidentified shrimp	1	1	<0.5
	Rock	1	1	<0.5
	Total number of stomachs examined	1		
	Number empty	0		

TABLE 49. (cont.)

Rockfish	Food item	Number of stomachs containing item	Number of items	Volume (ml)
Canary rockfish	Total number of stomachs examined	2		
	Number empty	2		
Olive rockfish	*Ammodytes* sp.	1	2	17
	Sebastes sp.	1	7	11
	Total number of stomachs examined	1		
	Number empty	0		

TABLE 50. Frequency of Occurrence, Number and Volume of 20 Food Items in Cabezon Stomachs - Mendocino Power Plant Site - 1972.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
COELENTERATA			
Abietinaria sp.	2	NC	TR
Sertularella sp.	1	NC	TR
MOLLUSCA			
Calliostoma costatum	1	1	TR
Fusinus luteopictus	1	6	2.8
Haliotis sp.	1	1	5.5
Octopus apollyon	7	33	34.0
Unidentified eulamellibranchs	2	3	2.8
ARTHROPODA			
Cancer antennarius	2	3	30.0
Cancer jordani	1	1	1.0
Cancer oregonensis	7	15	52.5
Cancer sp.	4	4	16.0
Chthamalus sp.	1	2	TR
Pachygrapsus crassipes	1	1	1.0
Pagurus sp.	1	1	TR
Petrolisthes eriomerus	1	2	3.0
Scyra acutifrons	1	3	21.0
Spirontocaris sp.	1	1	0.5
Unidentified crab	3	5	1.5
Unidentified crustacea	1	1	TR

TABLE 50. (cont.)

Food item	Number of stomachs containing item	Number of items	Volume (ml)
ECTOPROCTA			
Unidentified	3	NC	1.0
CHORDATA			
Apodichthys flavidus	1	1	2.5
Unidentified fish	3	3	10.0
Unidentified stichaeid	1	1	3.0
MISCELLANEOUS	3	NC	2.0
TOTAL NUMBER OF STOMACHS EXAMINED	14		
NUMBER EMPTY	0		

* Most remains consisted of beaks.
NC Not countable.

TABLE 51. Frequency of Occurrence, Number and Volume of 17 Food Items in Brown Irish Lord Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
NEMATODA	1	2	-
ANNELIDA			
Polychaet spicules	3	NC	-
Unidentified polychaets	2	2	0.5
MOLLUSCA			
Margarites sp.	1	1	<0.5
Octopus apollyon beaks	1	2	-
Small trochoid gastropod	1	1	<0.5
Unidentified chiton	1	1	<0.5
ARTHROPODA			
Cancer productus	1	1	<0.5
Cancer sp.	7	7	1.0
Idothea sp.	1	1	<0.5
Pagurus sp.	1	2	0.75
Petrolisthes cinctipes	2	3	0.5
Pugetia sp. (juvenile)	3	3	0.5
Scyra sp. (juvenile)	1	1	<0.5
Unidentified carid	4	5	1.0
Unidentified crustacean remains	8	-	3.0
Unidentified gammarid	5	9	1.0
Unidentified isopod (Poss. parasitic gill isopod)	1	1	<0.5

TABLE 51 (cont.)

Food item	Number of stomachs containing item	Number of items	Volume (ml)
CHORDATA			
Unidentified fish	1	1	1.0
MISCELLANEOUS	6	NC	1.0
TOTAL NUMBER OF STOMACHS EXAMINED	29		
NUMBER EMPTY	1		

food items from five phyla were observed. Small size and partial digestion of food items made specific identification difficult. Therefore, unidentified crustacean remains were the most frequently observed food items and represented the highest volume. Of the identifiable food items, *Cancer* spp. was observed in the greatest number of stomachs and gammarid amphipods contributed the largest number of individuals. Two nematodes were observed in one stomach.

Smoothhead sculpin - *Artedius lateralis.* Twelve smoothhead sculpin stomachs were examined, none of which were empty (Table 52). Thirteen food items from four phyla were observed. Cottids contributed the greatest volume of food, 38%. *Petrolisthes cinctipes*, porcelain crab, was the most common food item at the generic level. It was found in the most stomachs and was the main food item by volume at 25 ml. It is interesting to note one smoothhead sculpin stomach contained 23 parasitic gill isopods.

Longfin sculpin - *Jordania zonope.* Eleven longfin sculpins were collected from a depth of 6.1-9.1 m (20-30 ft) during a Chem-Fish collection in April 1973. Of the 11 stomachs, two were empty (Table 53). Six types of animals from three phyla were observed and gammarids contributed the highest volume, largest number of individuals, and was the most frequently observed food item.

Fluffy sculpin - *Oligocottus snyderi.* Eight large fluffy sculpins were examined and all of the stomachs contained food items (Table 54). Gammarids were the most common identifiable organisms. The stomachs of these fish were not full and most of the organisms were partially digested; over half of the stomach contents by volume were unidentifiable.

TABLE 52. Frequency of Occurrence, Number and Volume of 13 Items in Smoothhead Sculpin Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
ANNELIDA			
Unidentified nereid	1	1	2.0
ARTHROPODA			
Petrolisthes cinctipes	5	8	4.0
Spirontocaris brevirostris	1	1	1.5
Unidentified crab	3	3	1.5
Unidentified crustacean remains	1	1	<0.5
Unidentified gammarids	3	3	<0.5
Unidentified parasitic gillisopods	1	23	<0.5
MOLLUSCA			
Calliostoma sp.	1	1	<0.5
CHORDATA			
Liparis sp.	1	1	1.0
Oligocottus maculosus	1	1	2.0
Oligocottus rimensis	1	1	2.0
Unidentified cottid	2	2	2.0
Unidentified fish	3	3	<0.5
TOTAL NUMBER OF STOMACHS EXAMINED	12		
NUMBER EMPTY	0		

TABLE 53. Frequency of Occurrence, Number and Volume of Five Food Items in Longfin Sculpin Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
COELENTERATA			
Unidentified hydroid	1	1	<0.5
ANNELIDA			
Polychaet segments	1	NC	-
Polychaet setae	5	1	0.5
ARTHROPODA			
Idothea sp.	1	1	<0.5
Unidentified gammarid	6	33	1.0
MISCELLANEOUS	5	5	1.0
TOTAL NUMBER STOMACHS EXAMINED	11		
NUMBER EMPTY	2		

TABLE 54. Frequency of Occurrence, Number and Volume of Five Food Items in Fluffy Sculpin Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
ANNELIDA			
Polychaet setae	2	NC	-
Unidentified polychaet	1	1	<0.5
ARTHROPODA			
Spirontocaris sp.	1	1	0.5
Unidentified decapod material	3	3	1.0
Unidentified gammarids	1	8	0.5
Unidentified pycnogonid	1	1	<0.5
MISCELLANEOUS	2	2	1.0
TOTAL NUMBER OF STOMACHS EXAMINED	8		
NUMBER EMPTY	0		

Miscellaneous Fish

Northern clingfish - *Gobiesox maeandricus*. None of the five northern clingfish stomachs examined were empty (Table 55). Two phyla were represented, Mollusca and Arthropoda. Limpet, *Acmaea* spp., shells were observed in every stomach and four chitons, *Ischnochiton* sp. (?), were obtained from two stomachs. Volumes were not taken on the limpets because the shells would not give an accurate determination. Small kelp crabs, *Pugettia* spp., obtained from one of the clingfish were the only representative Arthropods.

Penpoint gunnel - *Apodichthys flavidus*. Four penpoint gunnel stomachs were examined; none were empty and all of them contained large numbers of Gammaridea (Table 56). The second most common food item was juvenile *Cancer* spp. (first instar stage). These crabs were observed in two of the stomachs. Arthropoda was the only phylum represented.

Discussion

Our results show the importance of crustaceans, molluscs and small fish in the diet of the fish studied. Sixty-seven percent of the food items were crustaceans representing 42% of the total volume. Molluscs accounted for 15% of the total numbers and for 18% by volume. Fish as food items accounted for 12% of the total number of items and 26% of the total volume. Together, these three groups comprise 94% of the total number and 86% of the total volume of animals found in the stomachs of the selected fish. These results generally agree with other studies about the feeding habits conducted on the same species.

TABLE 55. Frequency of Occurrence, Number and Volume of Seven Food Items in Northern Clingfish Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing item	Number of items	Volume (ml)
MOLLUSCA			
Acmaeidae (shells only)	3	6	-
Collisella limatula shells	2	2	-
Collisella scabra shells	1	1	-
Ischnochiton sp.	2	4	<0.5
Mytilus californianus	1	1	<0.5
ARTHROPODA			
Pugettia gracilis-richii complex	1	2	0.5
Chitinous remains (possibly shrimp)	1	1	<0.5
TOTAL NUMBER OF STOMACHS EXAMINED	5		
NUMBER EMPTY	0		

TABLE 56. Frequency of Occurrence, Number and Volume of Nine Food Items in Penpoint Gunnel Stomachs - Mendocino Power Plant Site - 1972-73.

Food item	Number of stomachs containing items	Number of items	Volume (ml)
ARTHROPODA			
Cancer sp. (first instar)	2	19	0.5
Idothea sp.	1	2	<0.5
Pagurus sp.	1	3	0.5
Pugettia sp.	1	2	<0.5
Spirontocaris brevirostris	1	1	1.0
Unidentified crabs (prob. *Pachygrapsus* sp.)	1	2	0.5
Unidentified crustacean material	1	1	2.0
Unidentified gammarids	4	78	2.0
Unidemtified shrimp	1	1	<0.5
TOTAL NUMBER OF STOMACHS EXAMINED	4		
NUMBER EMPTY	0		

Arthropods made up the largest part, by volume, of the diet of copper rockfish taken at Pt. Arena. Fishes and molluscs, in that order, followed in importance. The most important copper rockfish food item was the crab genus *Cancer* which comprised 35% of the diet. This agrees with another study on 241 copper rockfish taken in Humboldt Bay (Prince 1972). In Prince's study the most important individual food items were *Cancer magister* with a percent frequency of occurrence of 31.4, and gammarid amphipods (percent frequency of occurrence of 28.4). Gammarid amphipods did not appear in any of the Pt. Arena copper rockfish stomachs.

The presence of *Octopus appolyon* in some of the stomachs is significant in that a thorough intertidal and subtidal study of the area where the fishes were collected revealed none of this species.

The considerable variation in types of food items (17) indicates that the copper rockfish is an opportunistic fish with general feeding habits and therefore, its diet should change seasonally. The copper rockfish examined in this study were collected only during June and July. If collection had continued throughout the year, the diet may have shown greater variation.

No pelagic juvenile cabezon were collected and the demersal juveniles and adults from which stomachs were obtained ranged in size from 64 mm (2.6 inches) to 535 mm (21.4 inches) SL. Again, crabs were the most important food item (60% of total diet by volume) and *Cancer* sp. accounted for 78% of the crabs present. In an earlier food habits study on cabezon, O'Connell (1953), found that crabs are the most important item in terms of frequency of occurrence in the diet of cabezon and *Cancer* spp. were the most frequently observed single genus. O'Connell reported several other crab species including

Scyra, *Pachygrapsus*, and *Pagarus* (all of which were present in the stomachs of cabezon we examined) and pointed out the importance of fish as a dietary item for juvenile cabezon. While this study did not separate the cabezon into juvenile and adult fish, the importance of tidepool fish as a dietary item was apparent. Eight percent of the food items examined in this study were fishes. Most of these fishes were unidentified, due to advanced states of digestion, though *Apodichthys flavidus* and one stichaeid were found.

Our data on the fluffy sculpin agrees favorably with similar quantitative studies done by Nakamura (1973) and Johnson (1954). These papers noted gammarids as one of the most significant food items and discussed in detail all the food items we examined except Pycnogonida, which was not mentioned in either paper as a food item.

SPORTFISHERY STUDIES

Prepared by Daniel W. Gotshall and Eugene Witeck

The varied fauna of the Point Arena area attracts several types of sportfishermen. Probably the most sought after species is the red abalone, *Haliotis rufescens*. Large numbers of shorepickers and skindivers turn out for each major minus tide, particularly on weekends and holidays. The major limiting factor to the numbers of abalone fishermen is access to the rocky shore.

There are several types of hook-and-line fisheries that operate in and out of Point Arena Cove. A small but highly successful rental and private skiff fleet has existed since the mid 1950's and during the summer of 1972 a charter boat began taking fishermen out of the cove to fish reefs off Point Arena. The pier supports a small, easily accessible fishery, particularly during the summer months. Finally, a few fishermen utilize the cove to fish the rock shoreline.

The construction and operation of a power plant at Point Arena may effect any one, or all of those fisheries.

The objective of the sportfishery studies was to obtain data from which to measure any effect of the power plant construction or operation on the fisheries as indicated by changes in catch rates, species composition. During the study period we have conducted studies of the fishery for abalone and fin fish catch of skiff and party boat fishermen.

Methods

Interviews of abalone and skiff fishermen were conducted on randomly selected days during 1972. Sampling days for abalone fishermen were selected from days when the tide level fell below 0.0 m during the

period one half hour before sunrise to one half hour after sunset. In addition, abalone fishermen, skiff fishermen and party boat fishermen were interviewed as time permitted on days not included in the random sampling plan.

Data collected from each fisherman included area and hours fished, numbers of each species captured, and total lengths of each species (abalone-shell lengths). Abalone fishermen were arbitrarily separated into two categories: shorepicker and skindiver. If an abalone fisherman was wearing a neoprene suit (and all of the following: face plate, weight belt, and swim fins), he was classified as a skindiver, all others were considered shorepickers.

We recorded the number of fishing poles used by skiff and party boat fishermen since catch-per-unit-of-effort calculations are based upon catch-per-pole-per-day or hour, rather than per man. Total numbers of each type of fisherman were tallied for each random sampling day, as well as for some of the non-random days. Total effort for the year was calculated from mean numbers of fishermen on weekends and holidays, and weekdays multiplied by the number of possible days occurring during the year.

Results

Abalone

Generally the red abalone sportfishery operates in areas which, because of turbidity and surge, are not accessible to our subtidal sampling: roughly 0.6 to 6.1 m (2.1-20.1 ft). Thus the catch-per-unit-of effort data will serve as an index of abundance for this very important zone.

Abalone fishermen were interviewed at three separate access points: Point Arena Cove, and the two ranches immediately south of the cove (Figure 9). Because of a lack of manpower and fishing effort, we discontinued regular sampling at the ranches after July 1972. The area south of the pier and at the two ranches was considered South Control; the shoreline north of the pier was classified as the Central Area.

From March through the end of December 1972 we interviewed 499 shorepickers and 108 skindivers in the Central Area (Table 57). These fishermen had collected 1885 and 454 red abalone respectively. The highest catch rates occurred in July for the shorepickers and in July and October for the skindivers. The calculated total effort for this area amounted to 1179 shorepicker days and 154 skindiver days.

The South Control Area yielded a higher number of interviews; 1246 shorepickers and 279 skindivers (Table 58). Their combined catches amounted to 6676 abalone. Because we did not sample the two ranches for the entire period we have calculated the total fishing effort only for the fishermen utilizing the south cove where an estimated 458 shorepickers days and 215 skindiver days were expended. Generally, the catch-per-unit-of-effort was higher in the South Control Area than in the Central Area.

In 1972 the length frequencies were not separated for abalone taken from north of the pier and south of the pier in Arena Cove. The lengths were kept separate for Arena Cove and the two southern ranches (Figure 10). The mean and modal lengths for abalone for the cove were 195.3 and 200 mm (7.8 and 8.0 inches) respectively. Mean and modal lengths for the abalone from the two ranches were 194.0 and 190.0 mm (7.7 and 7.6 inches) respectively. As might be expected, at lower tides larger abalone were taken. This becomes apparent in comparing the modal lengths for each oceanographic period.

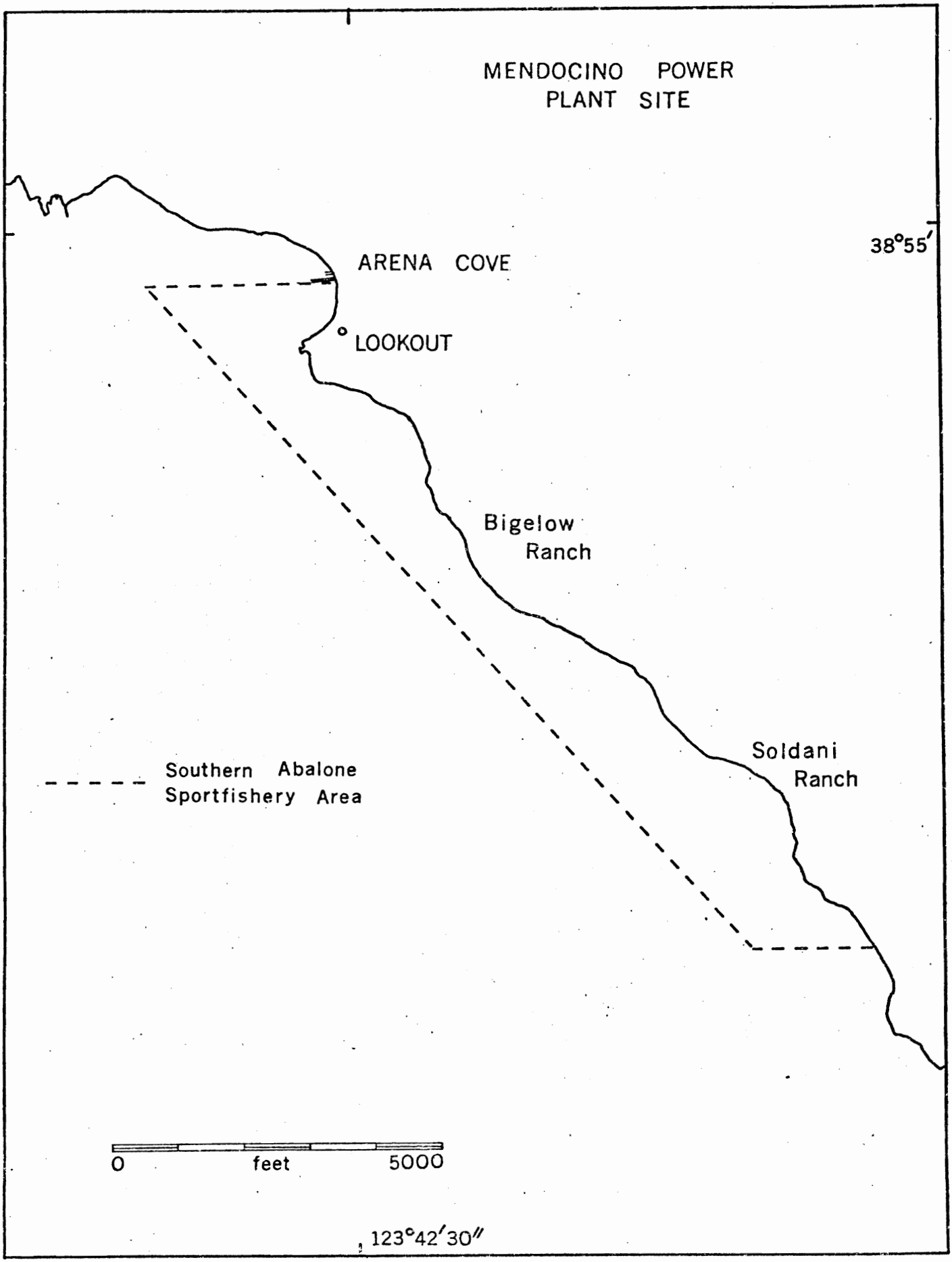

FIGURE 9. Abalone Sportfishing Areas - Mendocino Power Plant Site.

TABLE 57. Number and Catch-Per-Unit-of-Effort of Red Abalone Taken by Shorepickers and Skindivers - South Control Area - Mendocino Power Plant Site - 1972.

Shorepickers

	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Number of red abalone	419	255	4207	269	283	0	0	0	0	10	5443
Number of fishermen	108	51	954	61	70	0	0	0	0	2	1246
Hours	201.9	106.3	2114.4	109.3	134.5	0	0	0	0	3.0	2669.4
Abalone per day	3.9	5.0	4.4	4.4	4.0	--	--	--	--	5.0	4.4
Abalone per hour	2.1	2.4	2.0	2.5	2.1	--	--	--	--	3.3	2.0

Skindivers

Number of red abalone	378	75	750	30	30	0	0	0	0	0	1233
Number of fishermen	88	15	164	6	6	0	0	0	0	0	279
Hours	165.8	17.5	362.3	7.0	11.8	0	0	0	0	0	564.4
Abalone per day	4.3	5.0	4.6	5.0	5.0	--	--	--	--	--	4.4
Abalone per hour	2.3	4.3	2.1	4.3	2.5	--	--	--	--	--	2.2

TABLE 58. Number and Catch-Per-Unit-of-Effort of Red Abalone Taken by Shorepickers and Skindivers - Central Area - Mendocino Power Plant Site - 1972.

	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Shorepickers											
Number of red abalone	79	48	1263	141	183	0	0	0	81	90	1885
Number of fishermen	28	13	295	34	43	0	0	6	29	51	499
Hours	60.9	32.1	597.3	57.5	41.0	0	0	6.0	62.5	119.0	9763
Abalone per fisherman	2.8	3.7	4.3	4.1	4.3	--	--	0.0	2.8	1.8	3.8
Abalone per hour	1.3	1.5	2.1	2.4	4.5	--	--	0.0	1.3	0.8	1.9
Skindivers											
Number of red abalone	137	20	91	40	55	35	0	10	27	39	454
Number of fishermen	35	6	20	8	11	7	0	2	8	11	108
Hours	47.5	10.8	35.4	11.0	12.0	17.0	0	2.0	18.0	24.5	178.2
Abalone per fisherman	3.9	3.3	4.6	5.0	5.0	5.0	--	5.0	3.4	3.5	4.2
Abalone per hour	2.9	1.8	2.6	3.6	4.6	2.1	--	5.0	1.5	1.6	2.5

TABLE 59. Number and Catch-Per-Unit-of-Effort of Red Abalone Taken by Shorepickers and Skindivers - Central and South Control Areas - Mendocino Power Plant Site - 1973.

	Central Area			South Control Area		
			Shorepickers			
	April	May	Total	April	May	Total
Number of red abalone	304	336	640	185	143	328
Number of fishermen	67	78	145	42	31	73
Hours	172.2	163.2	335.4	90.0	65.0	155.0
Abalone per fisherman	4.5	4.3	4.4	4.4	4.6	4.5
Abalone per hour	1.8	2.1	1.9	2.1	2.2	2.1
			Skindivers			
Number of red abalone	114	194	308	278	185	463
Number of fishermen	23	47	70	56	42	98
Hours	56.5	106.5	163.0	128.2	89.5	217.7
Abalone per fisherman	5.0	4.1	4.4	5.0	4.4	4.7
Abalone per hour	2.0	1.8	1.9	2.2	2.0	2.1

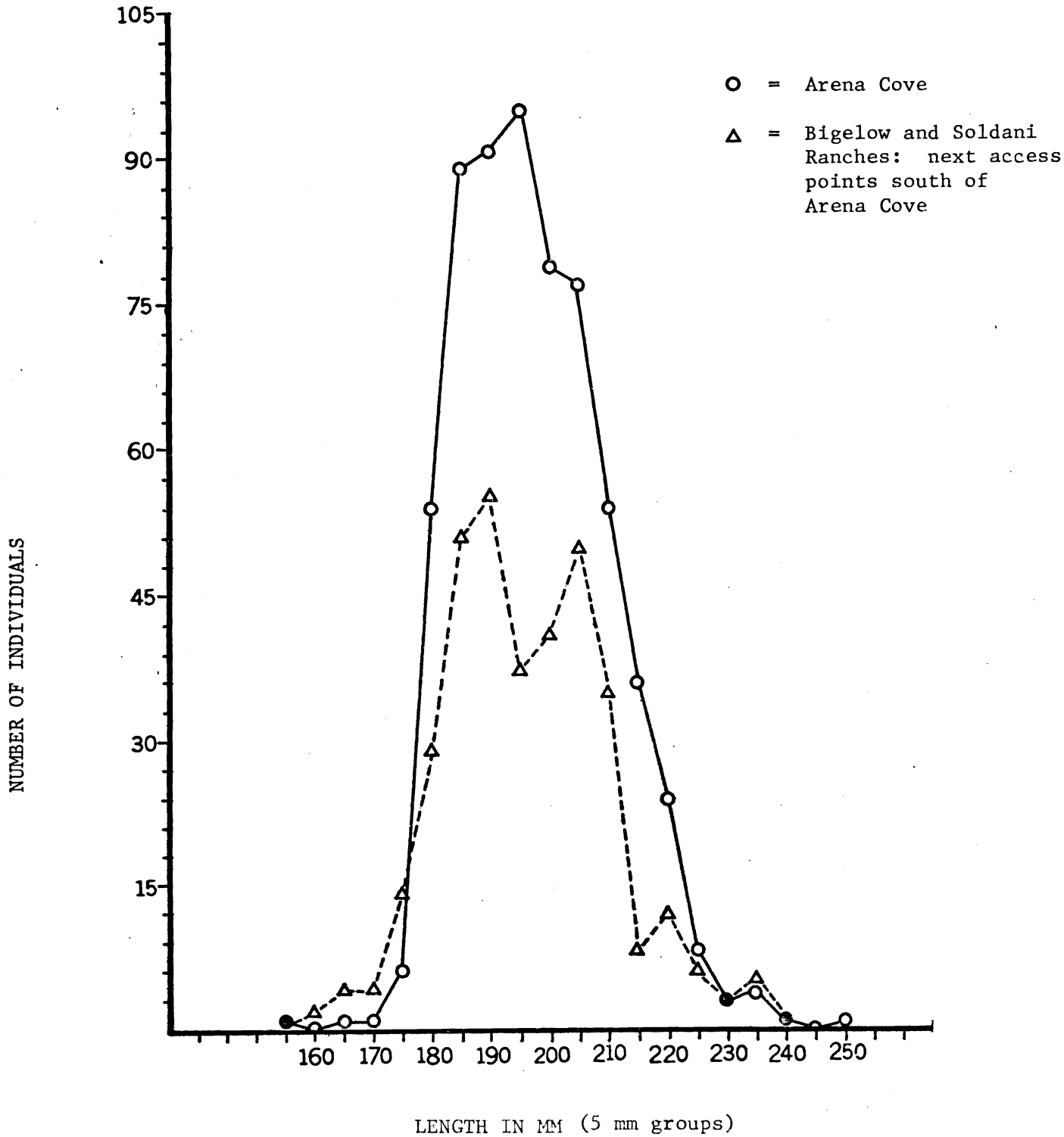

FIGURE 10. Length Frequencies of Red Abalone - Collected by Sportfishermen - Mendocino Power Plant Site - Davidson Current Period, December 1971 - March 1972.

During the Davidson Current Period of December 1971 through March 1972, the lowest tide occurrence on a sampling day was -0.2 m (-0.66 ft) on March 18 and 19, the modal abalone length for this period was 190 mm (7.6 inches) (Figure 11). The lowest tide on a sampling day during the Upwelling Period was -0.6 m (-2.0 ft) on May 14; in fact, all of the tides on sampling days during this period fell below -0.3 m (-1.0 ft). The principal modal abalone length during this period was 205 mm (8.2 inches) (Figure 12). During the Oceanic and early Davidson Periods of the winter of 1972-73, maximum low tides on sampling days were -0.4 m (-1.3 ft) and -0.6 m (-2.0 ft) respectively; principal modal lengths were 185 mm (7.4 inches) and 205 mm (8.2 inches) respectively (Figure 13).

During April and May 1973 we again interviewed abalone fishermen, primarily to determine if differences existed in sizes of red abalone from the North Cove (Central Area) and South Cove (South Control Area).

A total of 218 shorepickers and 168 skindivers were interviewed during five days of sampling (Table 59). The shorepickers catch consisted of 968 red abalone for an average catch-per-fisherman of 4.4 red abalone; skindivers averaged 4.6 red abalone per diver. Lengths of 1092 red abalone were recorded (Figure 14). Red abalone collected by shorepickers and skindivers in the South Control Area were larger than those harvested in the Central Area. The mean for the South Control and Central Areas were 200.6 and 205.5 mm (8.0 and 8.2 inches) and 195.8 and 200.2 mm (7.8 and 8.0 inches) respectively for shorepickers and skindivers catches (Table 60). Skindivers' catches generally were larger in both areas.

Analysis of the 1973 shell length data was conducted by Eugene Witeck, Operations Research Branch, to determine if the observed differences were significant.

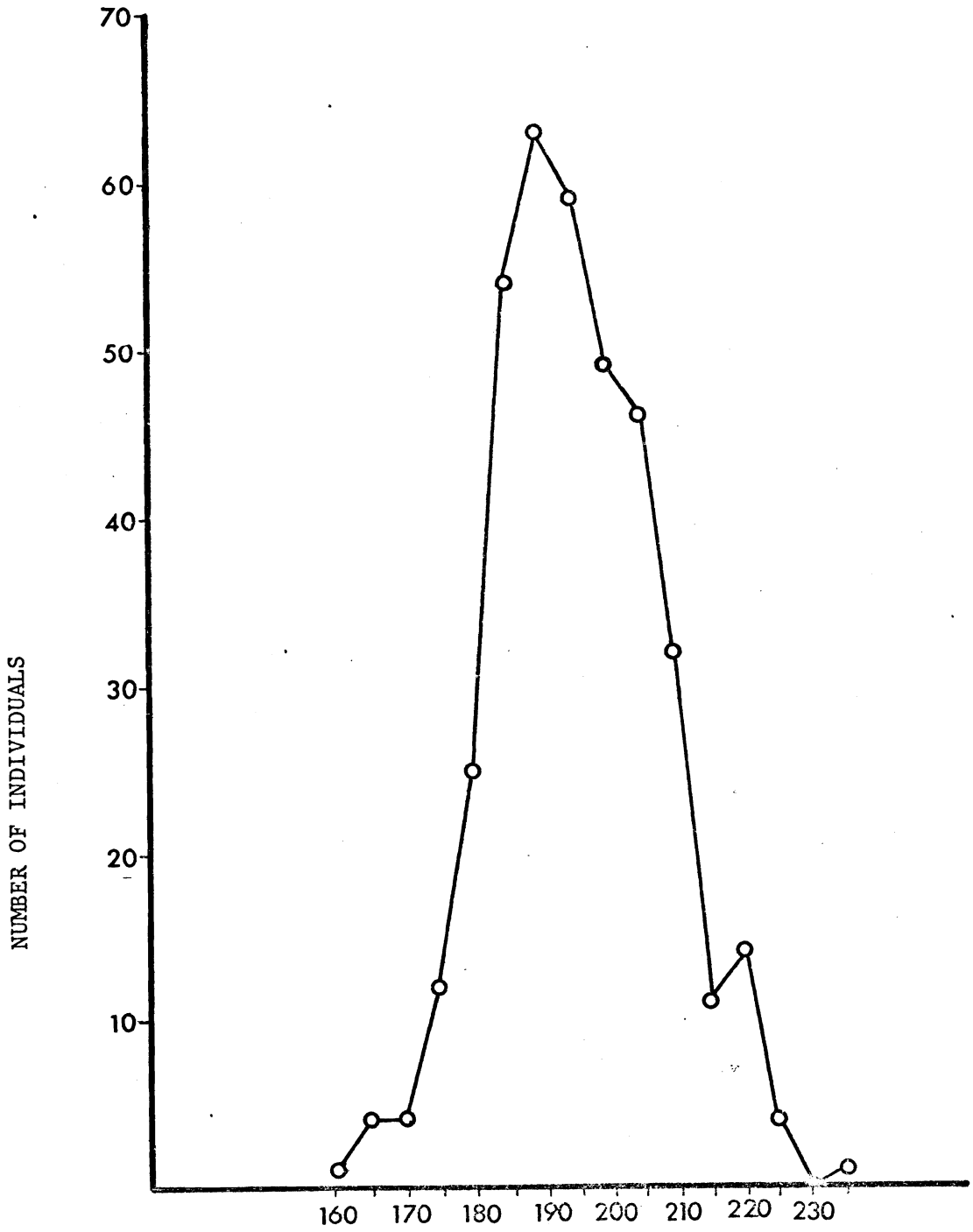

FIGURE 11. Length Frequencies of Red Abalone - Collected by Sportfishermen - Mendocino Power Plant Site - Davidson Current Period, December 1971 - March 1972.

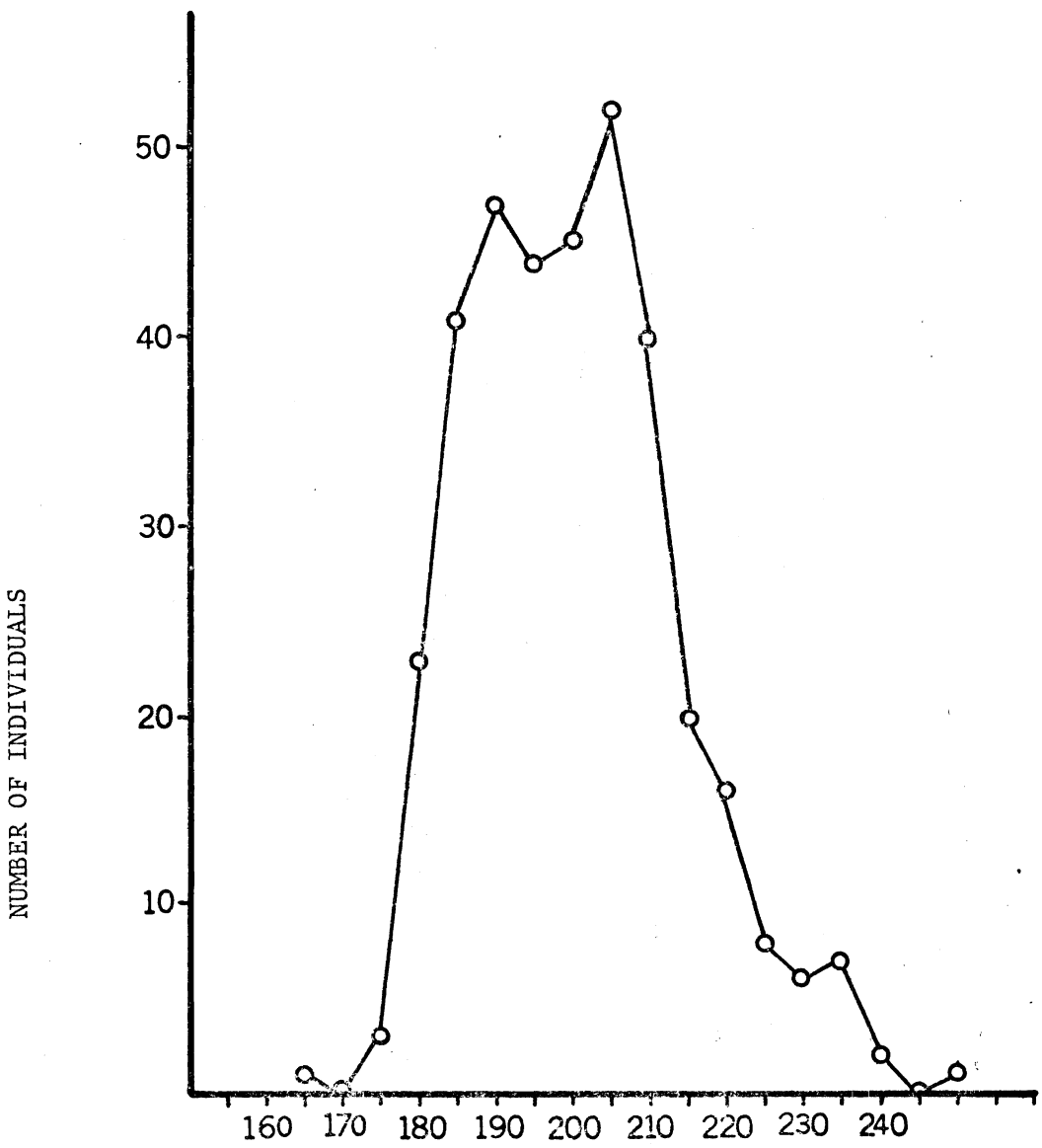

FIGURE 12. Length Frequencies of Red Abalone - Collected by Sportfishermen - Mendocino Power Plant Site - Upwelling Period; May-July 1972.

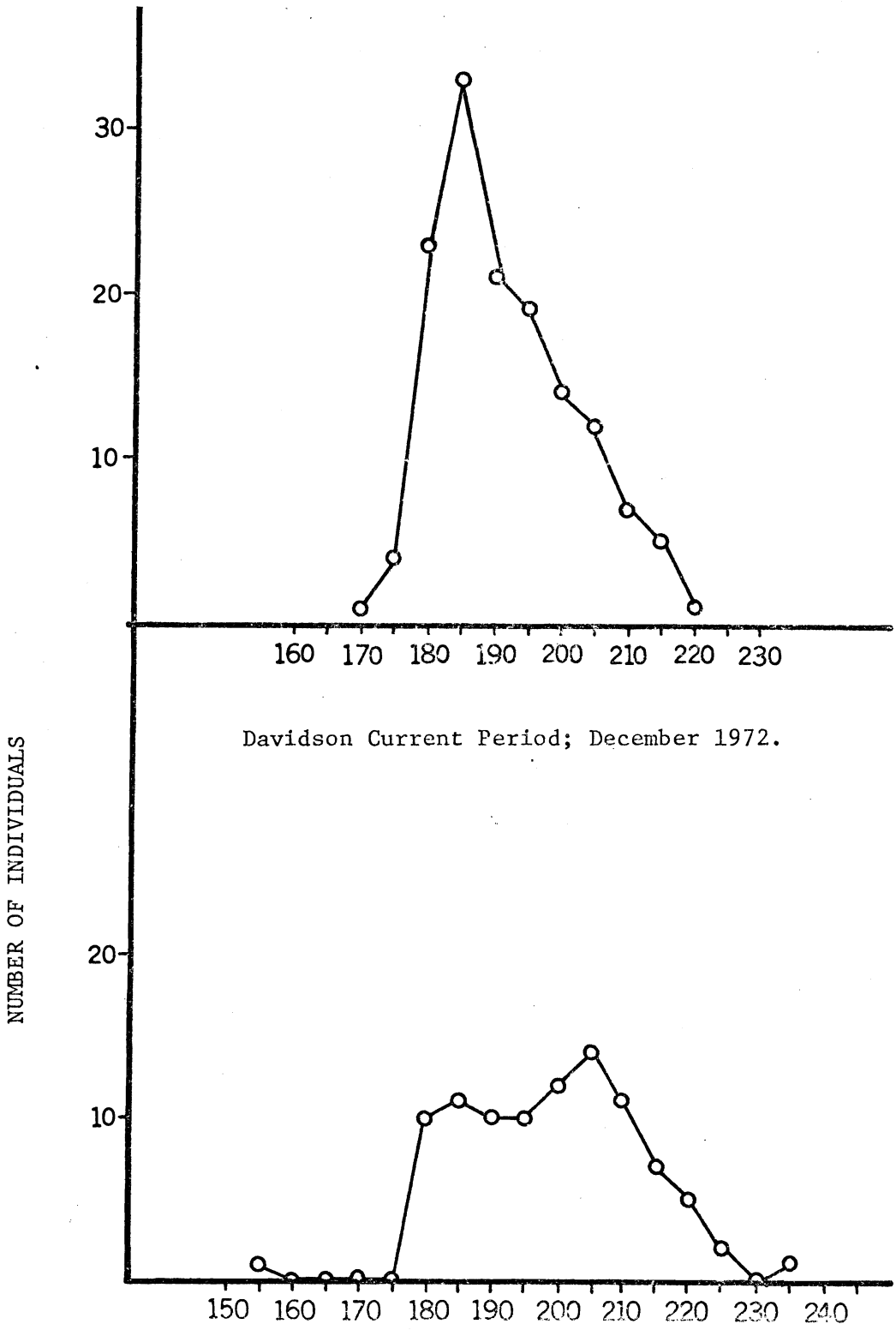

FIGURE 13. Lengths of Red Abalone - Collected by Sportfishermen - Mendocino Power Plant Site - Oceanic Period, September-November 1972; and Davidson Current Period, December 1972.

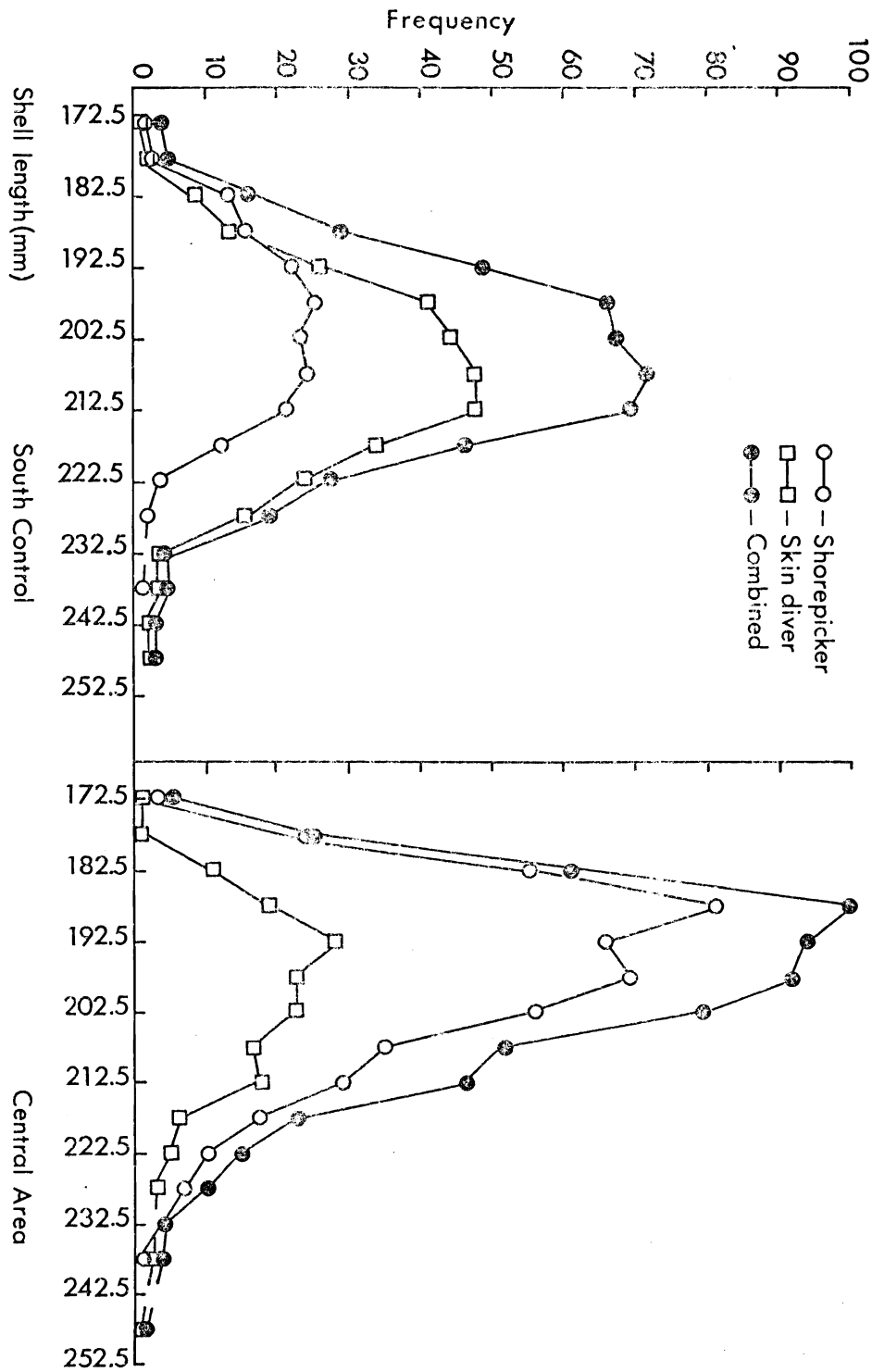

FIGURE 14. Lengths of Red Abalone - Collected by Sportfishermen - Mendocino Power Plant Site - April - May 1973.

TABLE 60. Comparison of mean lengths of red abalone taken by shorepickers and skindivers from North and South Arena Cove - Mendocino Power Plant Site - April - May 1973.

	Sample size	Mean length (mm)	Standard deviation
North Cove			
Shorepickers	457	195.84	12.31
Skindivers	158	200.15	12.22
Total	615		
South Cove			
Shorepickers	163	200.64	11.71
Skindivers	314	205.49	16.53
Total	477		

In the statistical analysis of the abalone lengths obtained by fishermen in the two cove areas, an analysis of variance model using a 2 X 2 factorial design was used. The first factor consisted of the two coves, North and South, while the second factor consisted of the two fishing methods, skindivers and shorepickers. Both factors were considered as fixed, that is, they were the only effects considered and were not selected from a group of possible effects. Due to the unequal sample sizes in each of the four subclasses, the factors or effects had to be adjusted. The results are contained in the analysis of variance table (Table 61), and are also given below.

The interaction and two factor terms can only be tested against the error term, the within samples (within each of the four subclasses) mean square. The interaction is not significant. The two factors, coves and fishing methods, are both highly significant, which means that red abalone from the South Cove and those taken by skindivers in both areas were significantly larger than red abalones from the Central Area or those taken by shorepickers.

TABLE 61. Analysis of Variance for Red Abalone Lengths 2 X 2 Factorial Design, Fixed Effects, With Unequal Numbers in the Subclasses - Mendocino Power Plant Site - April and May 1973.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F Values
Coves (Adjusted for Fishing Methods)	7619.902	1	7619.902	50.486
Fishing Methods (Adjusted for Coves)	6334.361	1	6334.361	41.969
Cove X Fishing Method	264.741	1	264.741	1.754*
Error	164211.354	1088	150.930	

*Interaction not significant $F(1, \infty, 0.10) = 2.7055$. $F(1,\infty, 0.005) = 7.8794$. Cove and fishing method effects are highly significant.

The random variable is: $x = y-170$, where y is the original length.

Reference: Anderson and Bancroft, 1959.

Bottomfish

A relatively small skiff fishery has operated out of Point Arena Cove since the 1950's. Rental skiffs are launched off the pier and private skiffs from the beach during the late spring, summer and early fall. Most of the fishermen direct their efforts towards the inshore reef fishes while very little effort is directed towards trolling for salmon. Most fishing takes place from Point Arena south to Saunders Reef in depths ranging from about 15.2 to 48.8 m (50.1-161.0 ft).

We interviewed 129 skiff fishermen from May through September; their catch consisted of 873 fish (Table 62). Lingcod (27.5%), black rockfish (23.2%), and copper rockfish (18.1%) were the three most commonly caught of the 19 species identified. Catch-per-hour ranged from a low of 0.88 fish in June to a high of 2.54 fish in August.

The monthly catch rates of party boat fishermen did not differ significantly from those of the skiff fishermen as seen in Table 63. A total of 83 fishermen interviewed between June and October caught 764 fish for a catch-per-hour rate of 2.04 fish (Table 64). The three most abundant fishes in the party boat catches were black rockfish (39.0), copper rockfish (11.0%), and lingcod (8.8%). Generally, the party boat fished west of Point Arena in depths of 22.9 to 48.8 m (75.6-161.0 ft) and this probably accounts, in part, for the difference in species composition.

In order to have confidence in using our species composition and catch-per-unit-of-effort data to detect changes in inshore reef fish population that might be caused by the construction and operation of a power plant, it is necessary to know whether the data has stability.

TABLE 62. Species compositon, and catch-per-unit-of-effort of fish landed by skiff fishermen - Mendocino power plant site - May-September 1972.

Species:	May			June			July			August			September			May-September Totals			
	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	C/D
Rockfish:																			
Black	25	15.9	0.40	30	24.6	0.22	36	32.7	0.32	62	29.7	0.75	50	18.2	0.43	203	23.2	0.40	1.56
Black & Yellow	0	0.0	0.00	1	0.8	0.01	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
Blue	5	3.2	0.08	11	9.0	0.08	0	0.0	0.00	5	2.4	0.06	2	0.7	0.02	23	2.6	0.04	0.18
Brown	7	4.4	0.11	4	3.3	0.03	3	2.7	0.03	2	1.0	0.02	1	0.4	0.01	17	1.9	0.03	0.13
Canary	4	2.5	0.06	4	3.3	0.03	4	3.6	0.04	15	7.2	0.18	6	2.2	0.05	33	3.8	0.06	0.25
China	2	1.3	0.03	6	4.9	0.04	1	0.9	0.01	9	4.3	0.11	3	1.1	0.02	21	2.4	0.04	0.16
Copper	24	15.3	0.38	26	21.3	0.19	33	30.0	0.30	36	17.2	0.44	39	14.2	0.33	158	18.1	0.31	1.22
Crass	0	0.0	0.00	1	0.8	0.01	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
Olive	0	0.0	0.00	0	0.0	0.00	2	1.8	0.02	0	0.0	0.00	0	0.0	0.00	2	0.1	T	0.02
Quillback	0	0.0	0.00	0	0.0	0.00	2	1.8	0.02	1	0.5	0.01	4	1.4	0.03	7	0.8	0.01	0.05
Turkey-red	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	5	1.8	0.04	5	0.6	0.01	0.04
Vermilion	5	3.2	0.08	2	1.6	0.01	3	2.7	0.03	13	6.2	0.16	22	8.0	0.19	45	5.2	0.09	0.35
Yellowtail	2	1.3	0.03	0	0.0	0.00	1	0.9	0.01	0	0.0	0.00	0	0.0	0.00	3	0.3	0.01	0.02
Unid. Rockfish	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	13	6.2	0.16	0	0.0	0.00	13	1.5	0.02	0.10
Flatfish:																			
Petrale sole	0	0.0	0.00	1	0.8	0.01	0	0.0	0.00	1	0.5	0.01	6	2.2	0.05	8	0.9	0.02	0.06
Rock sole	1	0.6	0.02	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
Miscellaneous:																			
Lingcod	76	48.4	1.21	13	10.6	0.09	17	15.4	0.15	39	18.7	0.47	95	34.5	0.81	240	27.5	0.47	1.85
Cabezon	2	1.3	0.03	17	13.9	0.12	6	5.4	0.05	9	4.3	0.11	37	13.4	0.32	71	8.1	0.14	0.55
Kelp greenling	4	2.5	0.06	6	4.9	0.04	1	0.9	0.01	4	1.9	0.05	5	1.8	0.04	20	2.3	0.04	0.15
King salmon	0	0.0	0.00	0	0.0	0.00	1	0.9	0.01	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
TOTAL	157	99.9	2.50	122	99.8	0.88	110	99.7	0.99	209	100.1	2.54	275	99.9	2.35	873	99.7	1.71	6.72
Sample Size																			
Skiffs		11			14			8			7			8			48		
Poles		28			38			22			21			21			130		
Hours		62.7			138.0			111.2			82.3			117.2			511.4		
Total Effort																			
Skiffs		52			29			22			36			60			199		

C/H = Catch-per-hour
C/D = Catch-per-day

TABLE 63. Monthly catch per unit of effort of skiff and party boat fishermen - Mendocino Power Plant Site - 1972.

	May	June	July	August	September	Season
Skiff	2.50	0.88	0.99	2.54	2.35	1.71
Party boat	No sample	0.23	2.20	3.70	1.85	2.04
			Number of fish			
Skiff	157	122	110	209	275	873
Party boat	No sample	18	53	381	312	764
			Hours fished			
Skiff	62.7	138.0	111.2	82.3	117.2	511.4
Party boat	No sample	79.0	24.0	103.0	168.8	374.6

	Average Monthly C/H	Std. Dev. Monthly C/H	
Skiff	1.852	0.84	$F = \frac{S_p^2}{S_p^2} = \frac{2.03}{0.71} = 2.86$
Party boat	1.995	1.42	$F(3,4,\alpha=0.05) = 6.59$

$$t = \frac{\bar{X}_p - \bar{X}_s}{s\sqrt{\frac{1}{m_p} + \frac{1}{m_s}}} = \frac{0.143}{0.758} = 0.19 \quad , \; t(7, \alpha=0.05)=2.36$$

Where $S^2 = \frac{(m_p-1)\,S_p^2 + (m_s-1)\,S_s^2}{m_p + m_s - 2}$

d.f. $= m_p + m_s - 2 = 7$

$\therefore$ Monthly rates not significant

TABLE 64. Species compositon, and catch-per-unit-of-effort of fish landed by party boat fishermen - Mendocino power plant site - June - September 1972.

Species:	June			July			August			September			June-September Totals			
	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	Number sampled	Percent comp.	C/H	C/D
Rockfish:																
Black	5	27.8	0.06	22	41.5	0.92	160	42.0	1.55	111	35.6	0.66	298	39.0	0.80	3.59
Blue	0	0.0	0.00	1	1.9	0.04	9	2.4	0.09	9	2.9	0.05	19	2.5	0.05	0.23
Brown	1	5.6	0.01	0	0.0	0.00	14	3.7	0.14	22	7.0	0.13	37	4.8	0.10	0.44
Canary	2	11.1	0.02	7	13.2	0.29	24	6.3	0.23	6	1.9	0.04	39	5.1	0.10	0.47
China	2	11.1	0.02	2	3.8	0.08	14	3.7	0.14	7	2.2	0.04	25	3.3	0.07	0.30
Copper	0	0.0	0.00	8	15.1	0.33	51	13.4	0.50	25	8.0	0.15	84	11.0	0.22	1.01
Gopher	0	0.0	0.00	1	1.9	0.04	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
Olive	0	0.0	0.00	1	1.9	0.04	1	0.3	0.01	0	0.0	0.00	2	0.3	T	0.02
Vermilion	2	11.1	0.02	2	3.8	0.08	25	6.6	0.24	20	6.4	0.12	49	6.4	0.13	0.59
Unidentified	0	0.0	0.00	0	0.0	0.00	42	11.0	0.41	77	24.7	0.46	119	15.6	0.32	1.43
Flatfish:																
Petrale sole	0	0.0	0.00	0	0.0	0.00	1	0.3	0.01	1	0.3	0.01	2	0.3	T	0.02
Rock sole	0	0.0	0.00	1	1.9	0.04	0	0.0	0.00	0	0.0	0.00	1	0.1	T	0.01
Miscellaneous:																
Lingcod	2	11.1	0.02	2	3.8	0.08	35	9.2	0.34	28	9.0	0.17	67	8.8	0.18	0.81
Cabezon	1	5.6	0.01	5	9.4	0.21	4	1.0	0.04	6	1.9	0.04	16	2.1	0.04	0.19
Kelp greenling	1	5.6	0.01	1	1.9	0.04	1	0.3	0.01	0	0.0	0.00	3	0.4	0.01	0.04
Silver salmon	2	11.1	0.02	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00	2	0.3	T	0.02
TOTAL	18	100.1	0.23	53	100.1	2.20	381	99.9	3.70	312	99.9	1.85	764	100.1	2.04	9.20
Sample Size																
Poles	14			6			30			33			83			
Hours	79.0			24.0			103.0			168.6			374.6			

C/H = Catch per hour
C/D = Catch per day

Fortunately, we have data that we can compare with the 1972 data. In 1959, the skiff fishery at Point Arena was surveyed as part of the Northern California sportfish survey.

A total of 89 fishermen were interviewed from July through October 1959, (Table 65). Their catch consisted of 802 fish for an overall catch-per-hour of 2.07 fish as compared with the 1972 season's catch-per-hour of 1.71 fish (Table 62). Black rockfish were caught at the rate of 0.28 fish-per-hour in 1959, but this value increased to 0.40 fish in 1972. Copper rockfish decreased from 0.42 to 0.31 fish-per-hour. The largest change in rates occurred with lingcod and blue rockfish; the lingcod catch rate increased from 0.21 in 1959 to 0.47 in 1972, while blue rockfish decreased from 0.35 to 0.04 fish. In 1959, the three most numerous species caught were copper rockfish, blue rockfish and black rockfish; as compared with lingcod, black rockfish and copper rockfish in 1972.

Sizes of some species showed a distinct change between 1959 and 1972. Canary rockfish lengths decreased from 447.5 to 394.5 mm (17.9-15.8 inches) TL, copper rockfish lengths decreased from 455.3 to 438.2 mm (17.8-17.5 inches) TL, and lingcod decreased from 753.7 to 653.9 mm (30.1-26.1 inches) TL (Table 66).

The 1959 and 1972 length data samples for 10 species were analyzed by the Department's Operations Research Branch to determine whether any significant changes had occurred in the lengths of these species. The "F" test was used to determine significance between pairs of variances and the "t" test to determine significance between the two means for each species. If the "F" test revealed a significant difference between the variances, a special form of the "t" test was used to test the two means for significance.

TABLE 65. Total catch by numbers, species composition, catch-per-unit-of-effort of fish landed by skiff fishermen - Mendocino power plant site - July - October, 1959*

Species	Number sampled	Percent Comp.	C/H+	C/D†	Total catch
Rockfish:					
Black	110	13.92	0.28	1.24	714
Black & Yellow	3	0.37	0.01	0.03	19
Blue	136	14.62	0.35	1.53	750
Brown	5	0.78	0.01	0.06	40
Canary	29	4.00	0.07	0.33	205
China	44	5.83	0.11	0.49	299
Copper	164	21.09	0.42	1.84	1082
Gopher	5	0.55	0.01	0.06	28
Olive	7	0.70	0.02	0.08	36
Quillback	16	2.42	0.04	0.18	124
Rosy	1	0.12	T	0.01	6
Turkey-red	47	5.55	0.12	0.53	285
Vermilion	71	8.89	0.18	0.80	456
Yellowtail	9	1.36	0.02	0.10	70
Widow	1	0.12	T	0.01	6
Flatfish:					
Petrale sole	1	0.12	T	0.01	6
Miscellaneous:					
Lingcod	82	9.26	0.21	0.92	475
Cabezon	35	4.89	0.09	0.39	251
Kelp greenling	36	5.44	0.09	0.40	279
TOTAL:	802	100.03	2.07	9.01	5131
SAMPLE SIZE:					
Skiffs	25				
Poles	89				
Hours	388				
TOTAL EFFORT:					
Skiffs	192				
Poles	682				

* Data from Miller and Gotshall, 1961.

\+ Catch-per-hour-per-pole.

† Catch-per-day-per-pole.

TABLE 66. Comparison of size range and mean total lengths of some fishes caught by skiff and party boat fishermen - Mendocino Power Plant Site - July-October 1959, May-September 1972.

Species	1959 Number measured	1959 Size range (mm tl)	1959 Mean length (mm tl)	1972 Number measured	1972 Size range (mm tl)	1972 Mean length (mm tl)
ROCKFISH						
Black	110	266 - 545	441.0	118	297 - 529	438.9
Blue	135	211 - 430	336.3	18	291 - 403	348.1
Brown	5	366 - 500	439.0	13	355 - 514	422.0
Canary	28	221 - 620	447.5	15	273 - 609	394.5
China	44	306 - 420	370.3	13	336 - 477	371.5
Copper	164	351 - 560	455.3	82	283 - 553	438.2
Vermilion	71	426 - 620	537.01	13	486 - 606	539.9
MISCELLANEOUS						
Lingcod	82	456 -1080	753.7	93	462 - 946	635.9
Cabezon	35	411 - 670	527.7	23	378 - 618	499.5
Kelp greenling	35	316 - 400	364.6	10	238 - 410	368.4

The "F" test shows that there is a significant difference between the two sample variances for china and copper rockfish, lingcod, and kelp greenling (Table 67). The "t" tests indicated that only the mean lengths of the copper rockfish and the lingcod for the two samples were significantly different.

The changes in species composition, catch rates, and sizes between 1959 and 1972 probably represent both natural fluctuations, harvesting effects, and differences in fishing techniques. Unfortunately, the stability of the various fish populations cannot be assessed from our data.

While interviewing skiff fishermen, we attempted to determine where they had been fishing. In many cases the fishermen had fished in both the North Control and Central Areas, or South Control (as used in abalone sportfishery study) and Central Areas. In some cases the fishermen had fished in all three areas. However, a substantial number of fishermen spent their entire fishing day in one area. We submitted the catch-per-hour data for six species that appeared to have significantly different catch rates for the three areas to Operations Research Branch personnel for analysis (Table 68).

The skiff catch-per-hour variables were analyzed using analysis of variance techniques. To stabilize the variances and to eliminate zero values, the transformation $\ln (C/H + 1) = X$ was used. The variance ratio of the between areas component to the within areas component tests the hypothesis that there is no significant variation between the average skiff catch-per-hour of the different areas. The variance rates provide the "F" values. In only one case, the vermilion rockfish, does the "F" value reveal a significant difference between the averages at the five percent level (Table 69). The "F" values less than one may be attributed to sample fluctuations about an average value of zero. Table 70 presents the total and species averages and standard deviations for each area. Appendix XXXII

TABLE 67. Summary of test of significance ("F" and "t") between total lengths of 10 species of fish caught by skiff fishermen - Mendocino Power Plant Site - July-October 1959, May-September 1972*.

	1972			1959				
	No. of fish	Mean	Variance	No. of fish	Mean	Variance	F	t
ROCKFISH								
Black	118	438.94	2783.29	110	440.95	2258.39	1.23	0.30
Blue	18	348.11	1441.52	135	336.33	2336.94	1.62	.99
Brown	13	422.00	2230.17	5	439.00	2492.50	1.13	.67
Canary	15	394.50	9785.55	28	447.46	9482.11	1.03	1.61
China	13	371.46	1248.44	44	370.30	401.69	3.11**	.11
Copper	82	438.21	3297.67	164	455.30	6625.58	2.01**	1.90(1)
Vermilion	13	539.92	1835.58	71	537.08	1522.36	1.21	.24
Lingcod	93	635.88	7764.98	82	753.67	15,496.15	2.00**	7.13(1)
Cabezon	23	499.52	3962.44	35	527.71	4276.49	1.08	1.63
Kelp greenling	10	368.40	2452.93	35	364.57	307.01	7.99**	.24

* Analysis conducted by Eugene Witeck, Operation Research Branch

** F> 5% level

t> 5% level

TABLE 68. Comparison of catch-per-hour data by area for six species of fish caught by skiff fishermen - Mendocino Power Plant Site - May through September 1972.

Species	North control area		Central area		North control area	
	No. of fish	C/H	No. of fish	C/H	No. of fish	C/H
Black rockfish	49	0.78	68	0.33	26	0.33
Canary rockfish	8	0.13	6	0.03	12	0.15
Copper rockfish	18	0.29	51	0.25	29	0.36
Vermilion rockfish	16	0.25	5	0.02	9	0.11
Lingcod	55	0.88	67	0.32	39	0.49
Cabezon	5	0.08	26	0.13	26	0.33
Miscellaneous	20	0.32	38	0.18	39	0.49
TOTAL FISH	171	2.72	261	1.26	180	2.25
TOTAL HOURS	62.8		206.8		79.9	
TOTAL SKIFFS	5		20		10	

C/H = Catch-Per-Hour

TABLE 69. Analysis of variance of skiff catch per hour - Mendocino Power Plant Site - 1972.

Source	Sum of squares	D.F.	Mean squares	F.	
I. Total: skiff catch per hour					
Between areas	1.09667	3-1 = 2	0.548335	1.4256	P>0.10
Within areas	12.30796	35-3 =32	0.384634		
Total	13.40463	34			
II. Black rockfish: skiff catch per hour					
Between areas	0.15493	2	0.077465	1.033	
Within areas	2.40039	32	0.075012		
Total	2.55532	34			
III. Canary rockfish: skiff catch per hour					
Between areas	0.10285	2	0.05143	1.201	
Within areas	1.37036	32	0.04282		
Total	1.47321	34			
IV. Copper rockfish: skiff catch per hour					
Between areas	0.22675	2	0.11338	0.94	
Within areas	3.87562	32	0.12113		
Total	4.10237	34			

TABLE 69. (cont.)

Source	Sum of squares	D.F.	Mean squares	F.
		V. Vermilion rockfish : skiff catch per hour		
Between areas	0.20960	2	0.10480	3.84*
Within areas	0.87344	32	0.02729	0.05>P>0.025
Total	1.08304	34		
		VI. Lingcod: skiff catch per hour		
Between areas	0.59161	2	0.29581	1.69 P>0.10
Within areas	5.60738	32	0.17523	
Total	6.19899	34		
		VII: Cabezon: skiff catch per hour		
Between areas	0.02923	2	0.01462	0.27**
Within areas	1.76128	32	.05504	
Total	1.79051	34		

The Random Variable is: $X = LN(C/H+1)$ $F(2,32\,\alpha+0.05)=3.30$

* Only F Valve Significant

** $F^1 = \frac{1}{F}$ Not Significant, $F(32,2,0.05)=19.46$, $F^1=3.7$

TABLE 70. Summary of skiff catch per hour - Mendocino Power Plant Site - 1972.

Area	Sample	Total		Black rockfish		Canary rockfish		Copper rockfish	
		Ave.	Std. dev.	Ave.	Std.dev.	Ave.	Std.dev.	Ave.	Std. dev.
North	5	4.22	5.08	0.62	0.68	0.25	0.42	0.58	0.82
Central	20	1.49	1.10	0.38	0.38	0.05	0.12	0.20	0.29
South	10	2.78	3.35	0.27	0.36	0.19	0.52	0.52	1.01

Area	Sample	Vermilion Rockfish		Lingcod		Cabezon	
		Ave.	Std.dev.	Ave.	Std.dev.	Ave.	Std.dev.
North	5	0.33	0.42	1.29	1.45	0.05	0.06
Central	10	0.03	0.12	0.42	0.53	0.18	0.33
South	15	0.14	0.28	0.69	0.97	0.20	0.47

presents the time, number of fish caught, and catch-per-hour for each skiff in the samples analyzed.

SUMMARY

1. On July 1, 1971 a contract was signed between Pacific Gas and Electric Company and the Department of Fish and Game, for the department to conduct preoperational ecological studies at Pacific Gas and Electric Company's proposed Nuclear Power Plant Site at Point Arena.

2. The specific objectives of the study were: (i) To conduct quantitative studies that would yield relative abundance indices for selected species including the important sport and commercial species present in the proposed outfall area and a control area. These indices would then be compared with indices derived from postoperational studies to determine if changes had occurred. (ii) To conduct qualitative studies to determine species composition of plant and animal communities in the outfall area and control area.

Field operations began in September 1971 when 12 randomly selected subtidal stations were occupied in the Central Area.

3. Based on the September 1971 survey, a stratified random sampling scheme was set up to quantify five species of brown algae and 35 species of invertebrates in the Central and North Control subtidal areas. Surveys were to be conducted during each of the three major oceanographic periods, i.e., Davidson, Upwelling and Oceanic.

4. *Laminaria setchellii* was the dominant brown alga observed during the September 1971 presurvey. Giant red sea urchins and red abalone were the most important invertebrates in terms of frequency of occurrence and biomass.

5. Fifty random and eight reconnaissance subtidal stations were occupied during 1972.

6. The data indicate differences in abundance did exist for the five species of brown algae during the various oceanographic periods. Highest densities were observed during summer surveys (upwelling and oceanic periods). However differences in densities of some invertebrate species between oceanographic periods are believed to be due to the difference in the number of stations sampled during each period (eight stations during the Davidson Period, 41 during Upwelling, and two during Oceanic Period).

7. The mean densities per station of some invertebrates were surprisingly close when the Central (outfall) and North Control Areas were compared. These included *Tealia crassicornis*, *T. lofotensis*, *Styela montereyensis*, *Tethya aurantia*, *Archidoris montereyensis*, *Cadlina luteomarginata*, *Ceratostoma foliatum*, *Haliotis kamtschatkana*, *H. rufescens*, *H. wallalensis*, *Dermasterias imbricata*, *Henricia leviuscula*, *Pycnopodia helianthoides*, *Stichopus californicus*, and *Strongylocentrotus franciscanus*.

8. When invertebrate densities were compared by 7.6 m (25 ft) depth increments, some species increased in density with depth, while others showed little or no change or had decreased density with increase in depth. The former included: *Tethya aurantia*, *Anthopleura artemesia*, *Tealia crassicornis*, *Austrodoris odhneri*, *Cadlina luteomarginata*, *Ceratostoma foliatum*, *Diodora aspera*, *Haliotis kamtschatkana*, *Dermasterias imbricata*, *Henricia leviuscula*, *Orthasterias koehleri*, *Solaster stimpsoni*, and *Stichopus californicus*. The following invertebrates decreased in density with increased depth:

Styela montereyensis, Cryptochiton stelleri, Halictis rufescens, Cucumaria miniata, Eupentacta quinquesmita, Pycnopodia helianthoides, Strongylocentrotus purpuratus and *S. franciscanus*.

9. Confidence intervals (50, 70 and 95 %) were calculated for three species of brown algae and seven species of invertebrates from mean-per-station data domparing the Central Area and North Control Area, and comparison of the three depth zones. Giant red sea urchins produced the smallest values in both the Central and North Control Areas and in all three depth zones.

10. Data of surveys and general observations, indicate that the two main limiting factors to red abalone abundance in the study area are availability of food and exposure to harsh sea conditions particularly during the winter.

11. The major red abalone predators observed in the Point Arena area were cabezon, *Pycnopodia helianthoides, Pisaster ochraceous,* and *Orthasterias koehleri*.

12. The giant red seas urchin is the most abundant and serious red abalone competitor.

13. Intertidal sampling was initiated during November 1971 and continued to February 1973. Two areas were studied: the intertidal adjacent to the proposed plant site, or Central Area, and a Control Area about 3/4 km (0.46 mile) north of the Central Area.

14. Sampling was conducted during minus tides utilizing standard stratified random sampling techniques. At each station, most non-cryptic macro-

invertebrates and the larger brown algae were counted and identified within a ¼ m^2 (2.7 ft^2) quadrat. Also, all soft red, green and smaller brown algae were collected for later biomass determination and the percent cover by articulated corraline algae was noted.

15. Sampling was done in three stratified life zones: Zone A, from 0.9 m (3.0 ft) above MLLW to about 1.8 m (6.0 ft) above; Zone B, from 0.0 m to 0.9 m (0.0-3.0 ft) above MLLW; and Zone C, from 0.0 m and lower.

16. The most common invertebrates in the intertidal of both study areas were, in descending order; *Strongylocentrotus purpuratus*, *Anthopleura elegantissima*, the Acmaeidae, *Tegula brunnea*, *Tegula funebralis*, *Mytilus californianus*, *Epiactis prolifera*, *Mopalia* spp./*Nuttallina californica*, *Tonicella lineata*, *Katharina tunicata* and *Leptasterias* spp.

17. Confidence intervals calculated at the 95% level indicate that the populations of these aforementioned animals are established well enough to serve as possible indices of biotic change.

18. The biomass study showed three genera of red algae to be dominant in one or more zones in the two study areas: *Odanthalia floccosa*, *Iridaea* spp. and *Endocladia muricata*. In Zone B of the Central Area, algal biomass averaged 51.49 gm/¼ m^2 (2.6 oz/ft^2), while in the Control Area the average was 54.57 gms/¼ m^2 (2.8 oz/ft^2).

19. The average monthly dry weights of soft algae seem to indicate that algal abundance varies annually and responds to upwelling conditions. The numbers of large brown algae found in the quadrats throughout the study period also seem to support this.

20. Collections using an ichthyocide were conducted at 27 intertidal stations to determine species composition and relative abundance for this important zone.

21. A total of 36 species of fish have been identified from these collections. Based on a calculated index of abundance (frequency of occurrence X total number collected) the three most important species were: *Xyphister atropurpureus*, *Oligocottus snyderi* and *Xyphister mucosus*, respectively.

22. A total of six subtidal ichthyocide stations were conducted. These stations yielded 38 species; *Hemilepidotus spinosus*, *Artedius harringtoni* and *Liparis fucensis*, respectively, were the dominant species based on the index of abundance.

23. Divers were able to identify a total of 40 species of fish during routine survey and reconnaissance dives. The dominant families involved were: Cottidae, Embiotocidae, Hexagrammidae, and Scorpaenidae.

24. Stomach contents of 14 species were examined to determine food preferences and detect species not encountered in our intertidal and subtidal surveys. A total of 146 stomachs was examined.

25. Octopus and crabs were the most frequently observed organisms in copper rockfish stomachs; salps were dominant in black rockfish stomachs; *Cancer* crabs in cabezon and brown Irish lord stomachs; the crab, *Petrolisthes*, in smoothhead sculpin stomachs and amphipods in longfin sculpin stomachs.

26. Abalone shorepickers and skindivers were interviewed from March 1972 through May 1973 to determine catch-per-unit-of-effort and size composition of the catch. From March through December 1972, interviews of 499 shore-

pickers and 108 skindivers were conducted in the Central Area, and of 1246 shorepickers and 279 skindivers in the South Control Area. Their catch amounted to 9015 red abalone. Generally, the catch-per-unit-of-effort was higher in the South Control Area.

27. The mean shell length of red abalone taken in the cove during 1972 was 195.3 mm (7.8 inches). Abalone from the ranches south of the cove had a mean shell length of 194.0 (7.7 inches). The highest mean shell lengths were observed during the periods of the lowest tides.

28. Red abalone from South Cove were significantly larger than those taken from North Cove. Also, those taken by skindivers were significantly larger than abalone taken by shorepickers during April and May 1973.

29. Sportfishermen fishing from skiffs and party boats were interviewed during 1972 to determine catch-per-unit-of-effort and species and size composition of the catch. A total of 873 fish composed of 19 species were caught by 129 skiff fishermen from May through September 1972. Lingcod, black rockfish and copper rockfish, respectively, were the three most commonly observed fish in the catch.

30. A total of 83 party boat fishermen were interviewed; their catch of 764 fish representing at least 15 species was dominated by black rockfish, copper rockfish and lingcod. There was not a significant difference between monthly catch rates of skiff and party boat fishermen.

31. Lengths of fish caught by skiff fishermen during 1972 was compared with data collected during a similar study in 1959. A significant difference was found to exist between sample variances of mean length for china

and copper rockfish, lingcod and kelp greenling (F test). A "t" test indicated differences in the mean lengths for copper rockfish and lingcod.

32. Catch rates for three areas frequented by skiff fishermen during 1972 were tested for significance. The rates for the vermilion rockfish were the only ones that showed a significant difference (F test).

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APPENDIX I

Brown Algae and Invertebrates Recorded at Subtidal Stations - 60 m^2 Linear Transects - Central Area - Mendocino Power Plant Site - September 1971 (Presurvey).

	Station numbers and number of organisms observed												
	Recon[1]	A[2]	35	93	118	146	191	199	246	251	264	274	312
ALGAE:													
Cystoseira osmundacea				P									
Desmarestia munda						A						A	
Egregia menziesii						2							
Laminaria setchellii				12/m^2	3	C	2			150/m^2	200	10/m^2	
Nereocystis luetkeana	P					3			P		30		
Pterygophora californica						6							
INVERTEBRATES:													
PORIFERA													
Unidentified sponges					P						P		2
ANNELIDA													
Unidentified Sabellids													C
Unidentified Terrebellids					C								
COELENTERATA													
Allopora porphyra					C								
Corynactis californica			A										

APPENDIX I (Cont.)

	Station numbers and number of organisms observed												
	Recon[1]	A[2]	35	93	118	146	191	199	246	251	264	274	312
COELENTERATA (Cont.)													
Metridium senile									1				
Rhabdodermella sp.					P								
Tealia spp.									P				P
MOLLUSCA													
Acmaea mitra											C		
Archidoris montereyensis													2
Cadlina luteomarginata													9
Calliostoma spp.		S	C		A			C	C		A	C	A
Cryptochiton stelleri				9	6		7				5	5	
Haliotis kamtschatkana	S	2	2				4	4		2	1		1
Haliotis rufescens	A			115	2	9			3		21	2	
Haliotis wallalensis				1		1						2	
Hinnites multirugosus													1
Tegula brunnea			5	C	3	C					A	C	
Thais emarginata					10								

APPENDIX I (Cont.)

	Station numbers and number of organisms observed												
	Recon[1]	A[2]	35	93	118	146	191	199	246	251	264	274	312
MOLLUSCA (Cont.)													
Tonicella lineata		C									C-A		
Unidentified Opisthobranchs			P										
Unidentified Pholads			P		C								
ECHINODERMATA													
Cucumaria miniata	C	1								1			
Dermasterias imbricata		2	P				6			3		1	
Henricia leviuscula		3	P	1	5		13			11	6	4	10
Leptasterias spp.					6								
Orthasterias koehleri												1	
Pisaster brevispinus		5	P		5		3			2	6		8
Pisaster giganteus		1			2					1		1	
Pisaster ochraceous				4							1	8	
Pycnopodia helianthoides		2	P		6	11	7			5	6	3	1
Solaster dawsoni		1											
Solaster stimpsoni		2					1				P		
Solaster spp.					5	1							16

	Station numbers and number of organisms observed												
	Recon[1]	A[2]	35	93	118	146	191	199	246	251	264	274	312
ECHINODERMATA (Cont.)													
Strongylocentrotus franciscanus	A	27	89		361	327	197	49	158	17	260	147	20
Strongylocentrotus purpuratus						7						189	
Unidentified Asteroids				2	P			P	P				
Unidentified Ophiuroids					A								P
DEPTH (m)	9.0-10.7	19.8-22.0	13.7-15.2	6.1-7.6	9.2-10.7	4.6	10.7-18.3	16.8-19.8	10.7-13.7	20.4-22.0	10.7-11.6	6.1-12.2	21.4-22.9

1. Recon = Reconnaissance station, not a 60 m^2 linear transect.

2. A = 60 m^2 linear transect occupied outside of survey area.

P = Present, not quantified

S = Sparse

C = Common

A = Abundant

( )* = Number of stations where counts were not made, not included in calculating mean.

APPENDIX II A

Physical Data for Subtidal Diving Stations - Mendocino Power Plant Site - September 1971 through October 1972.

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	Water temp (C) bottom	Bottom description
175 SO	Sep 18, 1971	calm	10.7-13.7	4.6		NR	depth 35-45' siltstone ledges with large boulders; small pocket of coarse sand 1 x 7 m.
195 SO	Sep 18, 1971	calm	16.8-19.8	4.6-6.1		NR	siltstone outcroppings, perpendicular to shoreline, one small pocket of cobble.
146 SO	Sep 18, 1971	calm	4.6	4.6		NR	siltstone outcroppings, 0.9 to 1.2 m profile.
312 SO	Sep 19, 1971	calm	21.4-22.9	7.6-9.2		NR	siltstone ledges.
118 SO	Sep 19, 1971	calm	9.2-10.7	6.1-7.6		NR	siltstone ledges.
35 SO	Sep 19, 1971	calm	13.7-15.2	3.0-4.6		NR	siltstone ledges, most of substrate bare.
93 SO	Sep 20, 1971	light sea	6.1-7.6	6.1-9.2		NR	siltstone ledges, upward slant towards west interspersed with coarse clean sand (20% of station area).

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	Water temp (C) bottom	Bottom description
264 SO	Sep 20, 1971	calm	10.7-11.6	6.1-7.6		NR	siltstone ledges running north - south.
274 SO	Sep 20, 1971	light sea	6.1-12.2	6.1-9.2		NR	siltstone ledge, 1/2 of transect on top of ledge at 6.1 m depth; other 1/2 on edge of ledge in 9.2 m.
251 SO	Sep 22, 1971	calm	20.4-22.0	4.6-6.1		NR	low siltstone ledges interspersed with rubble and cobble.
191 SO	Sep 22, 1971	calm	10.7-18.3	4.6-6.1		NR	steep uptilted siltstone ledges.
178 SO	Sep 22, 1971	calm	19.8-22.0	4.6-6.1		NR	siltstone ledges.
263 SC	Jan 16, 1972	calm	11.3	4.5-6.1	9.4	8.9	siltstone ledges.
53 SC	Jan 17, 1972	0.6 to 0.9 m swell	7.9	4.6	9.5	9.2	siltstone ledges.
74 SO	Jan 17, 1972	0.6 to 0.9 m swell	19.8	3.0-4.6	9.5	9.5	siltstone ledges.
206 SO	Jan 17, 1972	0.6 to 0.9 m swell	18.9	3.0-4.6	9.4	9.4	siltstone ledges.
313 SC	Feb 6, 1972	0.9 to 1.5 m swell	10.7-12.2	3.0-4.6	8.9	8.9	siltstone ledges.

APPENDIX II A (Cont.)

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	bottom	Bottom description
327 SC	Feb 8, 1972	calm	15.9	4.6-6.1	10.0	9.4	broken , sloping siltstone ledges.
173 SO	Feb 8, 1972	calm	2.4	4.6-6.1	10.6	10.0	siltstone ledges.
232 SO	Feb 8, 1972	calm	10.7	4.6-6.1	10.0	9.4	slanting siltstone ledges.
85 SO	May 12, 1972	slight sea	8.5-9.2	3.0-4.6	--	7.8	uptilted siltstone ledges, 1.5 m profile, 50 percent of station covered with coarse sand - 0.08 m deep.
230 SO	May 12, 1972	slight sea	16.8-17.7	3.0-4.6	--	7.8	uptilted siltstone ledges.
280 SO	May 13, 1972	slight sea	7.9-8.5	6.1		NR	siltstone ledges, 40 percent of station coarse clean sand.
308 SO	Jun 7, 1972	large swell	19.8	3.0	--	9.3	rocky rubble strewn among siltstone ledges.
225 SO	Jun 8, 1972	calm	16.5	3.0	10.0	10.0	siltstone ledges.
232 SC	Jun 8, 1972	calm	13.7-16.2	3.0	10.0	10.0	siltstone ledges.
153 SC	Jun 9, 1972	calm	19.8	1.5-3.0	10.6	8.9	siltstone ledges
318 SC	Jun 9, 1972	calm	13.7	3.0	10.6	8.9	slightly tilted siltstone ledges.
312 SC	Jun 9, 1972	calm	19.8	1.2	10.6	10.0	flat shale, boulders and rubble.

APPENDIX II A (Cont.)

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	bottom	Bottom description
58 SO	Jun 9, 1972	calm	9.2-10.7	1.5-3.0	10.6	8.9	siltstone ledges.
128 SC	Jun 21, 1972	large swell	6.7	3.0-4.6	9.4	8.9	flat siltstone ledges.
6 SC	Jun 21, 1972	large swell	6.1-9.2	3.0-4.6	9.4	8.9	sloping siltstone ledge shoreward side fell vertically to 12.2 m.
265 SC	Jun 21, 1972	large swell	16.8-19.8	3.0-4.6	9.4	8.9	sharply uptilted siltstone ledges - profile as much as 12.2 m.
316 SC	Jun 22, 1972	NR	10.7	3.0	10.0	9.4	flat siltstone ledges.
130 SO	Jun 22, 1972	NR	6.7	3.0	10.0	9.4	siltstone ledges with scattered boulders.
232 SC	Jun 23, 1972	light sea	8.5-9.4	3.0-4.6	NR	9.4	siltstone ledges.
230 SC	Jun 23, 1972	light sea	7.6-9.2	6.1-7.6	NR	9.4	siltstone ledges.
85 SC	Jun 23, 1972	light sea	4.3	4.6-6.1	NR	9.4	siltstone ledges, profile about 1.2 m.
29 SC	Jun 23, 1972	light sea	7.6	3.0-4.6	NR	9.4	siltstone ledges.
85 SO	Jun 24, 1972	big sea and swell	9.2-10.7	7.6	9.4	8.9	siltstone ledges.
314 SO	Jun 24, 1972	big sea and swell	17.4	7.6	9.4	8.9	half of station flat siltstone ledge; other half with 35° slope.

APPENDIX II A (Cont.)

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	Water temp (C) bottom	Bottom description
178 SO	July 6, 1972	big sea and swell	10.7-15.2	7.6	NR	8.9	steeply tilted shale ledge.
159 SO	July 7, 1972	light sea	7.3	3.0-4.6	9.4	8.3	boulders and silty sand over shale.
156 SO	July 7, 1972	light sea	10.7	6.1-7.6	9.4	8.3	shale covered with thin layer of silt.
199 SO	July 8, 1972	light sea	15.2-16.8	7.6	10.0	8.3	low profile siltstone ledges.
75 SO	July 8, 1972	light sea	5.8	7.6	9.4	8.3	low profile siltstone ledges.
7 SO	July 8, 1972	light sea	8.8	7.6	9.4	8.3	siltstone ledges, boulders.
301 SO	July 20, 1972	light sea	18.9	3.0-4.6	11.7	10.0	large (1.2-1.5m) boulders on flat siltstone.
223 SO	July 21, 1972	calm	13.1	3.0-4.6	12.8	10.0	low profile siltstone ledges, few boulders.
185 SO	July 21, 1972	calm	13.7-16.8	3.0	12.8	10.0	crevices formed by silt-stone ledges, 4.6 m high.

Station number	Date	Ocean condition	Depth (m)	Underwater visibility (m)	Water temp (C) surface	Water temp (C) bottom	Bottom description
46 SC	July 21, 1972	calm	5.8	4.6	12.8	12.2	flat siltstone reef.
131 SC	July 21, 1972	calm	7.0	3.0-4.6	12.8	12.2	siltstone ledges.
224 SC	July 22, 1972	calm	14.3-16.8	6.1	12.2	11.1	siltstone ledges.
246 SC	July 22, 1972	calm	4.6-7.6	6.1	12.2	11.7	siltstone ledges.
273 SC	July 22, 1972	calm	16.8	4.6	12.2	11.1	siltstone ledges.
308 SC	July 23, 1972	calm	9.2	6.1	11.1	10.0	siltstone ledges.
92 SC	July 23, 1972	calm	6.1	6.1	11.1	10.0	siltstone ledges.
50 SC	July 23, 1972	calm	6.1	4.6	11.1	10.0	siltstone ledges.
159 SC	July 24, 1972	calm	10.7	1.5-3.0	11.1	10.0	siltstone ledges.
121 SC	July 24, 1972	calm	4.6	6.1	11.1	10.0	siltstone ledges.
36 SC	July 25, 1972	light sea	6.1	6.1	11.1	10.0	on top of siltstone ledge with 1.8-2.4 m profile.
148 SC	Sept 10, 1972	big sea and swell	7.3	4.6	12.2	11.7	siltstone ledge.
108 SC	Sept 10, 1972	big sea	10.7	3.0	11.1	10.6	siltstone ledge.
111 SO	Oct 26, 1972	large sea	12.2-14.6	6.1	14.7	14.7	siltstone ledge.
282 SO	Oct 26, 1972	large sea	10.7-12.2	3.7-4.6	14.7	14.7	low profile siltstone ledges.

APPENDIX II A(Cont.)

Station number	Date	Ocean condition	Depth (m)	Underwater visibiltiy (m)	Water temp (C) surface	bottom	Bottom description
148 SO	Oct. 26, 1972	large sea	7.6	1.5-3.0	15.3	15.0	low profile siltstone ledges.
282 SO	Oct. 27, 1972	large sea	16.8	6.1*	14.7	14.4	high profile siltstone ledges with some course sand in pockets.
87 SO	Oct. 27, 1972	large sea	13.7	5.5*	15.0	14.5	low profile siltstone ledges.
144 SO	Oct. 27, 1972	large sea	12.2-12.5	7.0*	15.3	15.0	rubble and sand on siltstone.
156 SO	Oct. 28, 1972	large sea	9.2	0.9	14.2	14.2	siltstone covered with silty sand.
136 SO	Oct. 28, 1972	large sea	9.2-9.4	4.9*	14.4	14.2	flat siltstone.

NR - Data Not Recorded

* - Sechi Disc Reading

SO - Central Area

SC - North Control Area

APPENDIX II B

Physical Data from Intertidal Stations - Central and North Control Areas - Mendocino Power Plant Site - November 1971 through February 1973.

CENTRAL AREA Station number	Date	Tide level during Sampling	Time at sampling	Height of transect relative to tide level	Station description/remarks
23	Nov. 2, 1971	-1.1'	1550-1615	+0.0' - +2.5'	urchin dominated area - 2 Zone "C", 1 Zone "B"
44	Nov. 3, 1971	-1.2'	1600-1630	+1.0' - +1.5'	all Zone "B" quadrats
54	Nov. 3, 1971	-1.6'	1645-1730	+0.0' - +1.5'	all Zone "C"
44	Nov. 29, 1971	-1.0'	1500-1545	+2.0'	all Zone "B" - on level bench just seaward of high terrace
54	Nov. 29, 1971	-0.7'	1600-1630	+2.0' - +2.5'	all Zone "B"
44	Jan. 15, 1972	-1.1'	1600-1630	+0.0' - +3.5'	1 Zone "C", 3 Zone "B" quadrats
54	Jan. 15, 1972	-1.0'	1700-1745	+0.0' - +1.0'	all Zone "C" - large boulders and cobbles on station
33	Jan. 26, 1972	-0.9'	1430-1450	+0.5'	all Zone "C" - small, fractionated reef area littered with stones and small cobbles
36	Jan. 26, 1972	-0.8'	1335-1410	+1.0'	all Zone "B" - performed on finger reefs at Pt. Arena cove
48	Jan. 27, 1972	-1.0'	1530-1615	-0.5' - +1.5'	3 Zone "C", 1 Zone "B" - in channel near wave-swept point
3	Jan. 29, 1972	-1.1'	1530-1615	+3.0' - +4.0'	all Zone "B" - on side of surge channel in Loran cove - zonation modified upward due to surge
7	Apr. 15, 1972	-1.4'	0600-0630	+0.5' - +1.0'	all Zone "C"

APPENDIX II B (cont.)

CENTRAL AREA Station number	Date	Tide level during sampling	Time at sampling	Height of transect relative to tide level	Station description/remarks
9	Apr. 15, 1972	-1.0'	0700-0730	-0.5' - +1.0'	all Zone "C"
53	Apr. 16, 1972	-1.3'	0700-0730	+1.5' - +2.0'	all Zone "B" - about 1.5' above *Cystoseira/Laminaria* zone
59	Apr. 16, 1972	-1.0'	0750-0810	+0.5' - +1.5'	3 Zone "C", 1 Zone B - area barren due to sand scouring
43	May 14, 1972	-2.0'	0700-0730	+1.0' - +2.0'	all Zone "C" - on landward sloping bench
50	May 14, 1972	-1.0'	0810-0900	+0.5' - +2.5'	1 Zone "C", 3 Zone "B"
18	May 15, 1972	-1.5'	0800-0900	+0.0' - +3.0'	2 Zone "C", 2 Zone "B"
51	May 15, 1972	-1.5'	0800-0850	+1.0' - +2.5'	all Zone "B"
6	June 11, 1972	-1.6'	0630-0730	+3.0' - +5.0'	1 Zone "B", 3 Zone "A" - very rough seas
20	June 12, 1972	-1.7'	0705-0740	+0.5' - +4.0'	1 Zone "C", 3 Zone "B"
44	July 10, 1972	-1.3'	0605-0630	+0.0'	all Zone "C"
32	July 11, 1972	-1.2'	0640-0710	+1.0' - +2.0'	all Zone "B"
38	July 11, 1972	-1.0'	0720-0745	-0.5' - +0.5'	all Zone "C"
52	Nov. 18, 1972	-0.4'	1500-1615	+0.5' - +2.5'	all Zone "B" - on 45° sloping surge channel
31	Oct. 21, 1972	-0.5'	1635-1750	+2.0'	all Zone "B" - on seaward side of largest finger reef on point

APPENDIX II B (cont.)

CENTRAL AREA Station number	Date	Tide level during sampling	Time at sampling	Height of transect relative to tide level	Station description/remarks
23	Oct. 21, 1972	-0.4'	1520-1610	+6.0'	all Zone "A" - occupied in *Postelsia* Zone - rough seas.
32	Dec. 2, 1972	-0.2'	1500-1550	+0.0' - +1.5'	all Zone "B: - on seaward side of finger reef - 50° slope
47	Dec. 17, 1972	-1.0'	1500-1555	+2.0'	all Zone "B" - on landward sloping, curving bench
58	Dec. 17, 1972	-1.1'	1440-1510	+0.0' - +2.0'	2 Zone "C", 2 Zone "B" -transect across low profile reefs
25	Dec. 19, 1972	-1.9'	1530-1615	+0.0'	all Zone "C" - performed in appendix of a surge channel - rough seas
36	Dec. 19, 1972	-1.8'	1530-1615	+2.0' - +4.0'	3 Zone "B" - station incomplete due to rough seas
36	Feb. 13, 1973	-0.9'	1400-1420	+2.0' - +3.0'	all Zone "B" - on top of small finger reef
42	Feb. 14, 1973	-0.9'	1340-1415	+0.0' - +1.0'	all Zone "C" - low profile siltstone reef
4	Feb. 16, 1973	-0.9'	1610-1700	+2.0' - +4.0'	all Zone "B" - on periphery of small table-like rock
9	Feb. 16, 1973	-0.9'	1650-1720	+1.5' - +2.5'	all Zone "B" - shore side of surge channel in Loran cove
36	February 16, 1973	-1.5'	1445-1530	+0.0' - +1.5'	all Zone "C" - in surge channel between finger reefs

APPENDIX II B (Cont.)

NORTH CONTROL AREA Station number	Date	Tide level during sampling	Time at sampling	Height of transect relative to tide level	Station description/remarks
43	May 13, 1972	-0.6'	0755-0820	-0.5' - +0.0'	all Zone "C" - in befouled back-waters of Sea Lion Rock
31	June 11, 1972	-1.2'	0715-0750	+5.0'	all Zone "A" - on high bench in *Postelsia* zone
35	June 11, 1972	-1.4'	0630-0715	-0.5' - +0.0'	all Zone "C"
33	Oct. 19, 1972	+1.0'	1515-1615	+2.0' - +2.5'	all Zone "A"
41	Oct. 22, 1972	-0.9'	1635-1730	+1.0' - +5.0'	2 Zone "B", 2 Zone "A" - performed on sloping edge of bench in north Sea Lion cove
10	Nov. 3, 1972	+0.2'	1515-1610	+2.0' - +2.5'	all Zone "B" - just shoreward of *Postelsia* zone
33	Dec. 4, 1972	-0.5'	1530-1630	+4.0'	performed in remains of *Postelsia* zone - seas rough
38	Dec. 18, 1972	-1.0'	1425-1505	+0.0' - +1.0'	all Zone "C" - performed on north side of cove north of Sea Lion Rock - urchin dominated
31	Feb. 12, 1973	-0.6'	1235-1300	+2.0' - +3.5'	all Zone "B"
34	Feb. 12, 1973	-0.5'	1340-1415	+2.5' - +3.0'	performed just above *Lessoniopsis* zone - all Zone "B"
42	Feb. 12, 1973	-0.6'	1230-1315	+0.5' - +2.0'	low profile bench - all Zone "B"
15	Feb. 14, 1973	-1.0'	1510-1540	+5.0'	edge of protected surge channel - all Zone "A"

APPENDIX II B (cont.)

NORTH CONTROL AREA Station number	Date	Tide level during sampling	Time at sampling	Height of transect relative to tide level	Station description/ remarks
12	Nov. 5, 1971	-1.1'	1715-1745	+0.0'	all quadrats from Zone "C"
25	Nov. 5, 1971	-1.2'	1800-1830	-0.5' - +0.0'	all Zone "C" - located on edge of surge channel about 200m from cliff bluff
25	Nov. 30, 1971	-1.4'	1515-1545	+1.5' - +2.0'	all Zone "B" - performed on bench shoreward of *Postelsia* zone
33	Nov. 30, 1971	-1.0'	1620-1650	+4.0'	all Zone "A" - performed in *Postelsia* zone - very rough seas
38	Dec. 1, 1971	-1.2'	1600-1645	+3.0'	all Zone "B"
26	Jan. 28, 1972	-1.0'	1635-1715	-0.5' - +0.5'	all Zone "B" - on narrow shelf below large rock table - 50m NW of bluff point
40	Jan. 28, 1972	-1.2'	1540-1615	-0.5' - +0.0'	all Zone "C" - station in garbage-littered cove
4	Jan. 29, 1972	-1.0'	1700-1730	-0.5' - +0.5'	all Zone "C" - on low, corrugated shelf
5	Apr. 17, 1972	-1.3'	0710-0740	+1.0' - +1.5'	all Zone "B"
11	Apr. 17, 1972	-0.9'	0820-0900	+2.0' - +3.0'	all Zone "B"
43	Apr. 18, 1972	-1.0'	0840-0915	+0.5' - +1.5'	all Zone "C" - station located just south of old dump - had very unhealthy detritus-ridden look
25	May 12, 1972	-0.9'	0620-0715	+0.0' - +0.5'	all Zone "C"
31	May 12, 1972	-0.9'	0640-0720	+3.0' - +4.0'	all Zone "A" - on high bench in *Postelsia* zone
9	May 13, 1972	-1.9'	0615-0655	+1.0' - +3.0'	all Zone "B" - performed on 60° sloping channel below *Lessoniopsis*

APPENDIX II B (cont.)

NORTH CONTROL AREA Station number	Date	Tide level during sampling	Time at sampling	Height of transect relative to tide level	Station description/remarks
24	Feb. 14, 1973	-1.1'	1445-1520	+1.5' - +2.5'	low profile corrugated bench - all Zone "B"
49	Feb. 15, 1973	-1.1'	1545-1630	+0.0' - +1.0'	all Zone "C" - low profile reef just south of 'rocky' bridge in Sea Lion Rock cove
44	Feb. 15, 1973	-1.1'	1525-1555	+0.0'	low profile cobble and sand - all Zone "C"

APPENDIX III

Brown Algae and Invertebrates Recorded at Subtidal Stations - 30 m^2 Arcs Central Area - Mendocino Power Plant Site - January through March 1972.

	Station numbers and number of organisms observed							
	Central Area				North Control Area			
	74	173	206	232	327	313	263	53
ALGAE:								
PHAEOPHYTA								
Cystoseira osmundacea		15						3
Dictyoneurom californicum		25						
Laminaria setchellii		1		5		6		210
Pterygophora californica		1						
INVERTEBRATES:								
PORIFERA								
Haliclona sp.	1							
Tethya aurantia			1	1		P		
Unidentified						A		
COELENTERATA								
Abietinaria sp.					S	A		
Anthopleura artemesia	15							
Anthopleura xanthogrammica				1	2			
Balanophyllia elegans	A		A	C	S	S		
Corynactis californica			P	A		S		
Epiactis prolifera	10	A		1	A			A
Tealia spp.	2	3	1	3	1			3

APPENDIX III (Cont.)

	Station number and number of organisms observed							
	Central Area				North Control Area			
	74	173	206	232	327	313	263	53
ANNELIDA								
Diopatra ornata	A		P					
Unidentified Sabellids						A		
MOLLUSCA								
Acmaea mitra			A		A			
Astraea sp.				1				
Calliostoma spp.	A		P	A	C	A	A	
Ceratostoma foliatum	4		5			C	7	
Cryptochiton stelleri		3		1		6	5	5
Diodora aspera	1		4	1				
Fusinus harfordi					C	C	3	
Haliotis kamtschatkana	1		1	2	2	4		
Haliotis rufescens		13					4	21
Haliotis wallalensis							1	
Hinnites multirugosus					1			
Tegula brunnea		A		A		A	23	74
Thais emarginata	1							
Tonicella lineata		A	A		A	A		
Unidentified Amphineura								16
Unidentified Opisthobranchia			P					
Unidentified Pholadidae						C		

APPENDIX III (Cont.)

	Station numbers and number of organisms observed							
	Central Area				North Control Area			
	74	173	206	232	327	313	263	53
ARTHROPODA								
Crangon sp.						1		
Loxorhynchus crispatus						2		
Pagurus spp.		A			C	A		
Scyra acutifrons						2		
ECHINODERMATA								
Dermasterias imbricata	3			3	1	3		
Henricia leviuscula	4		8	12	12	3	3	
Leptasterias sp.							3	
Orthasterias koehleri	2		1				1	
Pisaster brevispinus	2	1	8				1	
Pisaster giganteus					2			
Pisaster ochraceous						1		
Pycnopodia helianthoides				2				1
Solaster dawsoni				1	2			1
Solaster stimpsoni			2	1				
Strongylocentrotus franciscanus	14		56	127	19	110	34	
Strongylocentrotus purpuratus							1	2
DEPTH (m)	19.8	1.5-2.4	17.7-18.3	9.2	10.7-12.2	10.7-12.2	12.2	7.9

P = present, not quantified
S = sparse
C = common
A = abundant

APPENDIX IV

Brown Algae and Invertebrates Recorded at Subtidal Stations - 30 m^2 Arcs - Central Area - Mendocino Power Plant Site - May through July 1972.

	Station numbers and number of organisms observed																			
	7	36	58	75	85	85	121	130	156	159	159	178	185	199	223	225	230	280	301	308	314
ALGAE:																					
PHAEOPHYTA																					
Costaria costata	8							2													
Cystoseira osmundacea				1								1						1			
Desmarestia latifrons					A																
Desmarestia munda	20	4	2160*	33		150	20	C		30											
Dictyoneurom californicum	30	9	2	3600*		1	70														
Dictyoneuropsis reticulata										1											
Laminaria setchellii	29	184	35	9	217	31	58	S		13		5		3				101			
Nereocystis luetkeana	5		3			57		22		3			3								
Pterygophera californica	1	24	21		37	5	23			2								17			
INVERTEBRATES:																					
PORIFERA																					
Haliclona sp.																			5		8
Rhabodermella nuttingi										C											S
Tethya aurantia															1						
Unidentified sponges		C-A				C		C					C-A		C				C		C-A

APPENDIX IV (Cont.)

	Station numbers and number of organisms observed																				
	7	36	58	75	85	85	121	130	156	159	159	178	185	199	223	225	230	280	301	308	314
COELENTERATA																					
Aglaophenia sp.																	C				C
Allopora porphyra						C													A		
Anthopleura artemesia				2					10			3	4	5							
Anthopleura xanthogrammica																	2				
Balanophyllia elegans								C		S	S		C						S	P	C
Corymorpha palma											C-A										
Corynactis californica													A						S	P	C-A
Epiactis prolifera	67	15	1	5			22	C				6	2	3			8		10		
Haliclystis stejnegeri												P	S								
Metridium senile						3													1		
Tealia crassicornus						1	1						1		1			2	2		
Tealia lofotensis		1		1		1		2											6		1
Tealia spp.			3																		
ANNELIDA																					
Diopatra ornata									A				C								
MOLLUSCA																					
Acmaea mitra							C-A						C							C	
Anisodoris nobilis		2		1				3					2	2	2		4		1		
Archidoris montereyensis																					2
Austrodoris odhneri											1								1		

APPENDIX IV (Cont.)

	Station numbers and number of organisms observed																				
	7	36	58	75	85	85	121	130	156	159	159	178	185	199	223	225	230	280	301	308	314
MOLLUSCA																					
Cadlina sp.	2	4	3				3	1			3	1	8	4	8		2		1	2	3
Calliostoma spp.		C-A	S			C		C				C	C		C	S					C
Ceratostoma foliatum	6	9					3	2				10	7	10	10	C	8				3
Cryptochiton stelleri	3	9		8		5	16	4	1	2			1	1			1	6	2		
Dendrodoris sp.	4						2						2						4		1
Dialula sandiegensis						1							1								1
Diodora aspera	2	2									1	12	3	3	3				2	1	
Dirona albolineata																					1
Duvaucelia exsulans										P	1										
Fusinus harfordi	1											10	3	9	5						
Haliotis kamtschatkana			1			1						8		4	3	3			2		2
Haliotis rufescens	4	7	9	21	6	2	2		2	19								49			
Haliotis wallalensis						1	1			1					1						
Hermissenda crassicornis																	1				1
Hinnites multirugosus	1																				
Placiphorella velata		1																			
Polinices sp.									1												
Rostanga pulchra		2					2								1						
Tegula brunnea						C															

APPENDIX IV (Cont.)

	Station numbers and number of organisms observed																				
	7	36	58	75	85	85	121	130	156	159	159	178	185	199	223	225	230	280	301	308	314
MOLLUSCA (Cont.)																					
Tegula spp.		C-A					C-A								S-C						
Thais emarginata													1								
Tonicella lineata		A					C-A	C				C	C		C						
Unidentified Opisthobranchs		1										P									
Unidentified Pholads						C									C	C					C
ARTHROPODA																					
Balanus glandula																		1			
Cancer sp.																					2
Cryptolithoides sitchensis																		1			
Loxorhynchus crispatus	1			1								2	1								2
Pagurus spp.		2							2	4					4						
Scyra acutifrons																				1	
ECHINODERMATA																					
Cucumaria miniata	18		3				4	8			1		1	1	1				3		1
Dermasterias imbricata			2			5		1				1	3		1	1	1	1		2	1
Eupentacta quinquesemita	10	1	3	1			7	2		1		4		3	3						1
Henricia leviuscula	9	12		4	1	2	7	4			1	13	9	9	9	3	2	1	21	5	10
Leptasterias sp.		7		1		1	3	1						1			2	2			
Mediaster aequalis												1									

APPENDIX IV (Cont.)

	Station numbers and number of organisms observed																				
	7	36	58	75	85	85	121	130	156	159	159	178	185	199	223	225	230	280	301	308	314
ECHINODERMATA (Cont.)																					
Orthasterias koehleri	1											1									
Patiria miniata												1	1			1			1	1	
Pisaster brevispinus			1		1	1		1	5	2	3			6		5		1		4	2
Pisaster giganteus							1								1						1
Pisaster ochraceous			1		1	6		1		1				1			2	3			
Psolus chitonoides												4									
Pteraster tesselatus arculatus													2								
Pycnopodia helianthoides			6	2		2		1	2	4					1	1			2		
Solaster dawsoni																1					1
Solaster stimpsoni												1				1					1
Stichopus californicus									1												
Strongylocentrotus franciscanus	176	43	69	43		98	99	135				67	52	19	55	43	26		37	14	21
Strongylocentrotus purpuratus		11	7				83														
Unidentified Asteroids																		1	2		
CHORDATA																					
Styela montereyensis	1	10	2		P	1					1										
DEPTH (m)	8.8	6.1	9.2-10.7	5.8	8.5-9.2	9.2-10.7	4.6	6.7	10.7	7.3	10.7	10.7-15.2	13.7-16.8	15.2-16.8	13.1	16.5	16.8-17.7	7.9-8.5	18.9	19.8	17.4

* Total based on expanded count in $\frac{1}{4}m^2$

APPENDIX V

Brown Algae and Invertebrates Recorded at Subtidal Stations - 30 m^2 Arcs - North Control Area - Mendocino Power Plant Site - May through July 1972.

	Station number and number or organisms observed																			
	6	29	46	50	85	92	128	131	153	224	230	232	232	246	265	273	308	312	316	318
ALGAE:																				
PHAEOPHYTA																				
Costaria costata			4			12					1									
Cystoseira osmundacea	5	15							12*											
Desmarestia herbacea			10	1							2			2			2			
Desmarestia munda		10	109	130		100	78*	3			94*		34	13			4		1	P
Desmarestia tabacoides											1									
Dictyoneurom californicum	3	C-A	3		A	29					C			31			23			
Laminaria setchellii	61	9	17	2	103	67	3	1	54*	2	45	4	10	70			39		11	4
Nereocystis luetkeana								1	2*		6			1						
Pterygophera californica	2	8	7	26	2		126*		2*		1			3			2			
INVERTEBRATES:																				
PORIFERA																				
Haliclona sp.																			2	2
Tethya aurantia								1		2										
Unidentified sponges					C					A				2	A		C		S	5

APPENDIX V - (Cont.)

	Station number and number of organisms observed																			
	6	29	46	50	85	92	128	131	153	224	230	232	232	246	265	273	308	312	316	318
COELENTERATA																				
Abietenaria sp.												C								C
Aglaophenia sp.												C								C
Anthopleura artemesia								2		8							S			
Balanophyllia elegans	S		S							C-A		S-C			S	C	S			C
Corynactis californica										C-A					A					
Epiactis prolifera	C	C	2	4		P	A				C	2	C	2			101			
Haliclystis stejnegeri											P						S			
Paracyathus stearnsii										S					A					
Tealia crassicornus			1						1		1					2				
Tealia lofotensis			1			1			3		2					1	3			
Tealia sp.		1																		
ANNELIDA																				
Diopatra ornata										C						C		A		
MOLLUSCA																				
Acmaea mitra																C	C-A			
Anisodoris nobilis				1				3	1	1		p							2	
Archidoris montereyensis		1						2		1		P					1			
Austrodoris odhneri										1			7			3				

APPENDIX V - (Cont.)

	Station number and number or organisms observed																			
	6	29	46	50	85	92	128	131	153	224	230	232	232	246	265	273	308	312	316	318
MOLLUSCA (Cont.)																				
Cadlina spp.		1				1		2	5	12	2	P	3	1	1	10	5			
Calliostoma sp.	C		S		C			A		C		S	C		A	C-A				C
Ceratostoma foliatum		C		5	1			3	5	11	5	S-C	9	1	5	3	2			S
Cratena sp.				1																
Cryptochiton stelleri	4	10	6	4	6	14	7	6	1	12	11		6	7			2		5	
Dendrodoris sp.		2	1			1	1	2		1	4			1		6	2			
Diaulula sandiegensis										2			1	1		1				
Diodora aspera						1				7	1			3	1	1			1	
Duvaucelia exsulans								1								1				
Fusinus harfordi				1				8		2	17		25			4	9			
Haliotis kamtschatkana								1		1		1			12	1	9		1	
Haliotis rufescens	1	32	5	1	33	4	9		3		2		3	13			1			
Haliotis wallalensis					1						2		1							
Hermissenda crassicornis																1				
Hinnites multirugosus	3				1					2	1		3	2		3	1			
Nuttalina californica												1								
Placiphorella velata																	1			
Rostanga pulchra			1										1			1				

APPENDIX V - (Cont.)

	Station number and number of organisms observed																			
	6	29	46	50	85	92	128	131	153	224	230	232	232	246	265	273	308	312	316	318
MOLLUSCA (Cont.)																				
Tegula brunnea		C-A			C		A													
Tegula sp.			C	C				A									A			
Tonicella lineata	C		S-C										1			C	C			P
Unidentified Opistobranchs															A			P		
Unidentified Pholads													C							
ARTHROPODA																				
Balanus nubilis					2								1							
Balanus sp.															A					
Cancer oregonensis														P						
Cancer sp.					1												1			
Loxorhynchus crispatus											3		3	1	1	1	3		1	
Pagurus sp.				C-A				2		4			7	1			2			1
Pugettia producta		1																		
Pugettia richii				2																
Pugettia sp.		1									1									
Scyra acutifrons												1								1
ECHINODERMATA																				
Cucumaria miniata		3	3		2	1	1	2	1	2	2		4	1	1	4				
Dermasterias imbricata	1									1	1				3	2	1	1	3	2

APPENDIX V - (Cont.)

	Station number and number of organisms observed																			
	6	29	46	50	85	92	128	131	153	224	230	232	232	246	265	273	308	312	316	318
ECHINODERMATA (Cont.)																				
Eupentacta quinquesemita		12			1	4		1		2	62		23	100	2	20	5	1		
Henricia leviuscula	1	2		1	3	1		3	6	7	5	12	4	21	8	23	9	3	1	16
Leptasterias sp.		2	1								1		2	3			1			1
Orthasterias koehleri							1			1						2				
Pisaster brevispinus								2	2	2			1			1		1		
Pisaster giganteus			3												1	1				
Pisaster ochraceous					2							1					1		1	
Psolus chitonoides										1										
Pteraster tesselatus arculatus															3	1				
Pycnopodia helianthoides		1	3		3	3		1			2		2	4			1			
Solaster stimpsoni						1												1	2	1
Stichopus californicus															1					
Strongylocentrotus franciscanus	83	8	61		19	63	51	25	35	40	118	16	43	111	51	47	146	8	112	82
Strongylocentrotus purpuratus	16	1	67		18	188								7			5			
CHORDATA																				
Styela montereyensis	1	1		1	1	1					1		3	7						
DEPTH (m)	6.1-9.2	7.6	5.8	6.1	4.3	6.1	6.7	7.0	10.7-13.7	14.3-16.8	7.6-9.2	13.7-16.2	8.5-9.4	4.6-7.6	16.8-19.8	16.8	9.2	19.8	10.7	13.7

* Total based on expanded count in 1/2 of Arc.

APPENDIX VI

Brown Algae and Invertebrates Recorded at Subtidal Stations - 30 m^2 Arcs - Central Area - Mendocino Power Plant Site - September - October 1973

	Station number and number of organisms observed									
	148	108	111**	282**	148**	282**	87**	144**	156**	136**
ALGAE:										
PHAEOPHYTA										
Desmarestia munda	110*		1	68*						
Dictyoneurom californicum					10					
Laminaria setchellii	60	4	5	127	87	1	8	7		
Nereocystis luetkeana	169	5	1	55	47	2				
Pterygophera californica	38		2	330	37		20	12		
INVERTEBRATES:										
PORIFERA										
Haliclona sp.			2							
Rhabdodermella nuttingi		S								S
Tethya aurantia			4			1		1		
Unidentified sponges		S	3	7		2				
COELENTERATA										
Anthopleura artemisia		S-C								C
Balanophyllia elegans	S	S	S	S		C-A		P	P	S
Corymorpha palma									P	

	Station number and number or organisms observed									
	148	108	111**	282**	148**	282**	87**	144**	156**	136**
COELENTERATA (Cont.)										
Epiactis prolifera		2			S					
Haliclystis stejnegeri		S								
Paracyathus stearnsii						C				
ANNELIDA										
Diopatra ornata		S-C					A			C
MOLLUSCA										
Acmaea mitra		C								C-A
Anisodiris nobilis			3			2				
Archidoris montereyensis				6						
Cadlina sp.		3	6	2			1			2
Calliostoma sp.		S		C		S				
Ceratostoma foliatum	1	4	9			4	1		S	
Cryptochiton stelleri	1		2	2	1			1		
Dendrodoris sp.				1		1				1
Diaulula sandiegensis										2
Diodora aspera		1	4	1	1	1	2	1		4
Duvaucelia exsulans						2				
Fusinus harfordi	1	1					7		S	10
Haliotis kamtschatkana		1	5			2	1			2

APPENDIX VI - (Cont.)

	Station number and number of organisms observed									
	148	108	111**	282**	148**	282**	87**	144**	156**	136**
MOLLUSCA (Cont.)										
Haliotis rufescens	3	1	2	6	37		4	5	S	1
Hermissenda crassicornis			2							1
Hinnites multirugosus						3				
Mopallia sp.							1			
Placiphorella velata		2								
Tegula sp.		S-C		S-C	C					C
Tonicella lineata		C		S						C
Triopha carpenteri				3						
Unidentified Opisthobranchs				6		1				
Unidentified Pholads										C
ARTHROPODA										
Balanus glandula						1				
Pagurus sp.		1								
Pandalus danii						1				
Pugettia sp.					1					
Scyra acutifrons				2		2		1		
ECHINODERMATA										
Dermasterias imbricata					3					
Eupentacta quinquesemita		1								

APPENDIX VI - (Cont.)

	Station number and number of organisms observed									
	148	108	111**	282**	148**	282**	87**	144**	156**	136**
ECHINODERMATA (Cont.)										
Henricia leviuscula	1	1	9	8	3	7	8	7		2
Leptasterias sp.		1								
Orthasterias koehleri		1								
Pisaster brevispinus	8	2	6	4	5	30	8	6	S	
Pisaster giganteus		1		1			1			
Pycnopodia helianthoides		2	2		3	6		1		1
Solaster dawsoni	1	1				2	1			
Solaster stimpsoni	1	1	2		1			1		
Strongylocentrotus franciscanus	116	170	55	183	79	41	236		S	77
Unidentified Asteroids		4								1
CHORDATA										
Styela montereyensis			2	7				1		
Unidentified Tunicates						2				
DEPTH (m)	7.3	10.7	12.2-14.6	10.7-12.2	7.6	16.8	13.7	12.2-12.5	9.2	9.2-9.4

* Total estimated from expanded count of ½ of Arc.

** Subjectively Random Reconnaissance Station, not included with Random Stations.

APPENDIX VII

Plants and Animals Identified from Intertidal and Subtidal Collections - Mendocino Power Plant Site - November 1971 through February 1973.

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
CHLOROPHYTA:			
Cladophora hemisphaerica Gardner	pincushion alga		X
Codium fragile (Suringer) Hariot	branching green alga		X
Enteromorpha sp.	green alga		X
Ulva lobata (Kutzing) Setchell and Gardner	sea lettuce		X
Ulva sp.	sea lettuce		X
PHAEOPHYTA:			
Alaria marginata Postels and Ruprecht	brown alga		X
Colpomenia sinuosa (Roth) Derbès and Solier	epiphytic brown alga		X
Costaria costata (Turner) Saunders	brown alga	X	X
Cystoseira osmundacea (Menzier) C.A. Agardh	brown alga	X	X
Desmarestia herbacea (Turner) Lamouroux	brown alga	X	X
Desmarestia latifrons (Ruprecht) Kützing	brown alga	X	
Desmarestia munda Setchell and Gardner	brown alga	X	
Desmarestia tabacoides Okamura	brown alga	X	

ALGAE

Scientific name	Common name (or description)	Subtidal	Intertidal
PHAEOPHYTA (cont.):			
Dictyoneurum californicum Ruprecht	brown alga	X	X
Egregia menziesii (Turner) Areschoug	feather boa kelp	X	X
Fucus distichus Linnaeus subsp. *edentatus* (De la Pylaie) Powell	brown alga		X
Haplogloia andersonii (Farlow) Levring	brown alga		X
Heterochordaria abietina (Ruprecht) Setchell and Gardner	brown alga		X
Laminaria setchellii Silva	brown kelp	X	X
Lessoniopsis littoralis (Farlow and Setchell) Reinke	"oak" kelp		X
Nereocystis luetkeana (Mertens) Postels and Ruprecht	bull kelp	X	
Pelvetia fastigiata (J.G. Agardh) De Toni	brown alga		X
Pelvetiopsis limitata (Setchell) Gardner	brown alga		X
Postelsia palmaeformis Ruprecht	palm kelp		X
Pterygophora californica Ruprecht	tree kelp	X	
RHODOPHYTA:			
Amplisiphonia pacifica Hollenberg	red alga		X
Antithamnion baylesiae Gardner	red alga	X	
Bossiella sp.	articulated coralline alga		X
Botryoglossum farlowianum (J.G. Agardh) De Toni	red alga	X	X
Botryoglossum ruprechtiana (J.G. Agardh) De Toni	red alga	X	

APPENDIX VII (cont.)

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
RHODOPHYTA (cont.):			
Calliarthron sp.	articulated corraline alga	X	X
Callithamnion sp.	red alga		X
Callophyllis crenulata Setchell	red alga	X	
Callophyllis firma (Kylin) Norris	red alga	X	
Callophyllis flabellulata Harvey	red alga	X	
Callophyllis pinnata Setchell and Swezy	red alga	X	X
Constantinea simplex Setchell	red alga	X	X
Corallina chilensis Decaisne	articulated coralline alga		X
Corallina vancouveriensis Yendo	articulated corraline alga		X
Cryptopleura lobulifera (J.G. Agardh) Kylin	red alga		X
Cryptopleura violacea (J.G. Agardh) Kylin	red alga		X
Delesseria decipiens J.G. Agardh	red alga		X
Dilsea californica (J.G.Agardh) O.Kuntze	red alga	X	
Endocladia muricata (Postels and Ruprecht) J.G. Agardh	red alga		X
Erythrophyllum delesserioides J.G. Agardh	red alga		X
Farlowia mollis (Harvey and Bailey) Farlow and Setchell	red alga	X	X

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
RHODOPHYTA (cont.):			
Fryeella gardneri (Setchell) Kylin	red alga	X	
Gastroclonium coulteri (Harvey) Kylin	red alga		X
Gelidium coulteri Harvey	red alga		X
Gigartina agardhii Setchell and Gardner	red alga		X
Gigartina californica J.G. Agardh	'turkish towel' alga		X
Gigartina canaliculata Harvey	red alga		X
Gigartina corymbifera (Kützing) J.G. Agardh	'turkish towel' alga		X
Gigartina cristata (Setchell) Setchell and Gardner	red alga		X
Gigartina papillata (C.A. Agardh) J.G. Agardh	red alga		X
Gloiosiphonia californica (Farlow) J.G. Agardh	red alga		X
Halosaccion glandiforme (Gmelin) Ruprecht	red alga		X
Halymenia coccinea Harvey (:Abbott)	red alga	X	
Hedophyllum sp.	red alga		X
Herposiphonia rigida Gardner	red alga		X
Hymenena cuneifolia (:Abbott)	red alga	X	
Hymenena flabelligera (J.G. Agardh) Kylin	red alga	X	X
Hymenena multiloba (J.G. Agardh) Kylin	red alga		X
Iridaea flaccida (Setchell and Gardner) Hollenberg and Abbott	red alga		X

APPENDIX VII (cont.)

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
RHODOPHYTA (cont.):			
Iridaea heterocarpa Postels and Ruprecht	red alga		X
Iridaea cordata var. *splendens* (Setehell and Gardner) Abbott	red alga		X
Laurencia spectabilis Postels and Ruprecht	red alga		X
Lithothamnium sp.	encrusting coralline alga	X	X
Microcladia borealis Ruprecht	red alga		X
Microcladia coulteri Harvey	red alga	X	X
Neoptilota californica (Harvey) Kylin	red alga		X
Neoptilota densa (C. Agardh) Kylin	red alga		X
Neoptilota hypnoides (Harvey)	red alga		X
Nienburgia andersoniana (J.G. Agardh)	red alga		X
Odonthalia floccosa (Esper) Falkenberg	red alga	X	
Odonthalia washingtoniensis Kylin	red alga	X	
Opuntiella californica (Farlow) Kylin	red alga	X	X
Pikea californica Harvey	red alga	X	
Pleonosporium squarolusum (Harvey) Abbott	red alga	X	X
Plocamium cartiligeneum (L.) Dixon	red alga		X
Plocamium violaceum Farlow	red alga		X

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
RHODOPHYTA (cont.):			
Polyneura latissima (Harvey) Kylin	red alga	X	
Polysiphonia hendryi Gardner	red alga		X
Polysiphonia pacifica Hollenberg	red alga		X
Polysiphonia paniculata Montague	red alga		X
Porphyra sp.	red alga		X
Prionitis australis J.G. Agardh	red alga	X	
Prionitis filiformis Kylin	red alga	X	
Prionitis lanceolata Harvey	red alga	X	X
Prionitis linearis Kylin	red alga	X	
Pterochondria woodii (Harvey) Hollenberg	red alga		X
Pterosiphonia bipinnata (Postels and Ruprecht) Falkenberg	red alga		X
Pterosiphonia dendroidea (Montagne) Falkenberg	red alga		X
Pugetia fragilissima Kylin	red alga	X	
Rhodoglossum affine (Harvey) Kylin	red alga	X	
Rhodomela larix (Turner) C.A. Agardh	red alga		X
Rhodymenia pacifica Kylin	red alga	X	X
Rhodymenia palmata var. *mollis* Setchell and Gardner	red alga	X	X

APPENDIX VII (cont.)

ALGAE Scientific name	Common name (or description)	Subtidal	Intertidal
RHODOPHYTA (cont.):			
Schizmenia pacifica Kylin	red alga	X	X
Smithora naiadum (Anderson) Hollenberg	red alga		X
Stenogramme interrupta (C.A. Agardh) Montagne	red alga	X	
SPESMATOPHYTA:			
Phyllospadix scouleri Hooker	surf grass		X

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Protozoa				
Gromia sp.	foraminifera		X	
Phylum: Porifera				
Acarnus sp.	red volcano sponge	X		
Haliclona sp.	finger sponge	X		
Leucosolenia sp.	white sponge	X		
Rhabdodermella nuttingi Urban, 1902	urn sponge	X		
Tethya aurantia (Pallas) *californiana* de Laub, 1932	puffball sponge	X*		
Unidentified	basket sponge	X		
Unidentified	yellow encrusting sponge	X		

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Porifera (cont.)				
Unidentified	orange encrusting sponge	X		
Unidentified	gray encrusting sponge	X		
Phylum: Coelenterata				
Abietinaria sp.	cup hydroid	X	X	
Aglaophenia sp.	ostrich plume hydroid	X		
Allopora porphyra (Fisher, 1931)	hydrocoral	X		
Anthopleura artemesia (Pickering in Dana, 1848)	burrowing anemone	X*		
Anthopleura elegantissima (Brandt, 1835)	aggregating anemone		X*	
Anthopleura xanthogrammica (Brandt, 1835)	solitary anemone	X	X*	
Aurellia aurita (Linnaeus, 1746)	scyphozoan			X
Balanophyllia elegans Verill, 1864	solitary hydrocoral	X	X*	
Chrysaura melanaster Brandt, 1838	scyphozoan			X
Corymorpha palma Torrey, 1902	fairy palm hydroid	X		
Corynactis californica Calgren, 1936	club tentacle anemone	X		
Epiactis prolifera Verill, 1869	proliferating anemone	X	X*	
Gersemia rubiformis (Pallas, 1788)	alcyonacean (sea strawberry)	X		
Haliclystis stejnegeri Kishinouye	stalked scyphozoan	X		

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Coelenterata (cont.)				
Metridium senile (Linnaeus, 1767)	white anemone	X		
Pachycerianthus fimbriatus (McCurrich 1910)	tube anemone	X		
Paracyathus stearnsii Verill, 1869	solitary coral	X		
Pelagia panopyra (Peron and Lesueur, 1807)	scyphozoan			X
Tealia crassicornus (Muller, 1776)	red anemone	X*	X*	
Tealia lofotensis (Danielssen, 1890)	strawberry anemone	X*		
Velella velella (Linnaeus 1767)	by-the-wind sailer			X
Phylum: Ctenophora				
Beroe sp.	ctenophore			X
Pleurobrachia sp.	sea walnut			X
Phylum: Nemertea		X	X	
Phylum: Annelida				
Diopatra ornata Moore, 1911	tube worm	X		
Halosydna brevisetosa Kinberg, 1855	scale worm		X	
Unidentified nereid polychaets	"clam" worms		X	
Unidentified sabellid polychaets	plume worms		X	
Unidentified terebellid polychaets	terebellid		X	

INVERTEBRATES

Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Mollusca				
Acmaea mitra Eschscholtz, 1833	dunce cap limpet	X	X*	
Acmaea spp.	limpets		X*	
Adula falcata (Gould, 1851)	falcate date mussel	X		
Aegires albopunctatus MacFarland, 1966	dorid nudibranch	X		
Amphissa columbiana Dahl, 1871	wrinkled snail		X	
Anisodoris nobilis (MacFarland, 1905)	sea-lemon dorid nudibranch	X*		
Archidoris montereyensis (Cooper, 1862)	yellow dorid nudibranch	X*		
Astraea sp.	turban snail	X		
Austrodoris odhneri (MacFarland, 1966)	dorid nudibranch	X*		
Bittium attenuatum Carpenter, 1864	screw snail		X	
Cadlina flavomaculata MacFarland, 1966	dorid nudibranch	X		
Cadlina luteomarginata MacFarland, 1966	dorid nudibranch	X*		
Calliostoma annulatum (Martyn, 1784)	ringed topsnail	X		
Calliostoma canaliculatum (Martyn, 1784)	topsnail	X		
Calliostoma costatum (Martyn, 1784)	blue topsnail	X	X	
Callistochiton crassicostatus Pilsbry, 1892	chiton	X		
Ceratostoma foliatum (Gmelin)	three-wing murex	X*		
Chlamys sp.	scallop	X		

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Mollusca (cont.)				
Collisella limatula (Carpenter, 1864)	file limpet	X		
Collisella pelta (Rathke, 1833)	shield limpet		X*	
Collisella scabra (Gould, 1846)	rough limpet		X*	
Cratena sp.	eolid nudibranch	X		
Crepidula adunca Sowerby, 1825	hooked slipper limpet		X	
Crepidula rummaria Gould, 1846	slipper limpet	X		
Crepidula sp.	slipper limpet		X	
Cryptochiton stelleri (Middendorff, 1846)	gumboot chiton	X*	X*	
Dendrodoris sp.	dorid nudibranch	X*		
Diaulula sandiegensis (Cooper, 1862)	dorid nudibranch	X		
Diodora aspera (Eschscholtz, 1833)	rough keyhole limpet	X*		
Dirona albolineata MacFarland, 1966	eolid nudibranch	X		
Duvaucelia exsulans (Bergh, 1884)	eolid nudibranch	X		
Epitonium sp.	wentletrap		X	
Flabellina iodinea (Cooper, 1882)	eolid nudibranch	X		
Fusinus harfordi Stearns	spindle shell	X*		
Haliotis kamtschatkana Jonas, 1845	pinto abalone	X*		

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Mollusca (cont.)				
Haliotis rufescens Swanson, 182	red abalone	X*	X*	
Haliotis wallalensis Stearns, 1899	flat abalone	X*		
Hermissenda crassicornis (Eschscholtz, 1831)	eolid nudibranch	X		
Hinnites multirugosus (Gale, 1928)	rock scallop	X*		
Irus lamellifer (Conrad, 1837)	burrow clam	X		
Ischnochiton regularis (Carpenter, 1855)	red chiton		X	
Katharina tunicata (Wood, 1815)	leather chiton		X*	
Lacuna marmorata	chink snail		X	
Lacuna porrecta Carpenter, 1863	whide chink snail		X	
Littorina scutulata Gould, 1849	periwinkle		X	
Megathura crenulata (Sowerby, 1825)	keyhole limpet	X		
Mopalia ciliata (Sowerby, 1840)	hairy chiton		X*	
Mopalia hindsii (Reeve, 1847)	hairy chiton		X*	
Mopalia lignosa (Gould, 1846)	hairy chiton		X*	
Mopalia muscosa (Gould, 1846)	mossy chiton		X*	
Notoacmea persona (Rathke, 1833)	mask limpet		X*	

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Mollusca (cont.)				
Nuttallina californica (Reeve, 1847)	striped chiton		X*	
Octopus dofleini appollyon	octopus	X	X	
Oncidella sp.	shell-less limpet		X	
Placiphorella velata Carpenter in Dall, 1878	veiled chiton	X		
Polinices lewisii (Gould, 1847)	moonsnail	X		
Protothaca staminea (Conrad, 1837)	little neck clam		X	
Pseudomelatoma torosa (Carpenter, 1865)	turrid snail	X		
Rostanga pulchra MacFarland, 1905	red dorid nudibranch	X	X	
Searlesia dira (Reeve, 1846)	spindle shell snail	X	X*	
Tegula brunnea (Philippi, 1848)	brown turban snail	X	X*	
Tegula funebralis (Adams 1854)	black turban snail		X*	
Tegula pulligo (Martyn, 1784)	turban snail	X	X	
Thais emarginata (Deshayes, 1839)	emarginate dogwinkle snail	X	X*	
Tonicella lineata (Wood, 1815)	lined chiton	X	X*	
Triopha carpenteri (Stearns, 1873)	dorid nudibranch	X		

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Mollusca (cont.)				
Tochuina tetraquetra (Pallas, 1788)	eolid nudibranch	X		
Unidentified	dorid nudibranchs	X		
Unidentified	eolid nudibranchs	X		
Unidentified	Pholad clams	X		
Phylum: Arthropoda				
Achelia chelata (Hilton, 1939)	pycnogonid		X	X
Achelia echinata Hodge, 1864	pycnogonid		X	X
Amphithoe lacertosa (Bate, 1858)	gammarid amphipod		X	X
Amphithoe simulans Alderman, 1936	gammarid amphipod		X	
Balanus cariosus (Pallos, 1788)	rock barnacle		X*	
Balanus glandula Darwin, 1854	barnacle	X		
Balanus sp.	barnacle	X	X	
Betaeus harfordi (Kingsley, 1878)	shrimp	X		
Cancer antennarius Stimpson, 1856	rock crab	X	X*	
Cancer jordani Rathbun, 1900	crab		X	
Cancer magister Dana, 1852	market crab (megalops stage)			X

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Arthropoda (cont.)				
Cancer oregonensis	Oregon cancer crab	X	X*	
Cancer productus	red crab		X	
Chthamalus sp.	barnacle	X		
Crago sp.	shrimp	X		
Cryptolithoides sitchensis Brandt, 1853	umbrella crab	X		
Hapologaster cavicauda Stimpson 1859 (1962)	furry crab		X	
Hyale rubra frequens (Stout, 1913)	gammarid amphipod		X	
Idothea stenops (Benedict, 1898)	isopod		X	
Lecythorhynchus marginatus Cole, 1904	pycnogonid		X	
Lophopanopeus bellus (Stimpson, 1960) (1862)	black-clawed crab		X	
Loxorhynchus crispatus Stimpson, 1875	masking crab	X*	X*	
Mimulus foliatus Stimpson, 1860	spider crab	X	X*	
Oedignathus inermis (Stimpson, 1860)	crab		X	
Oligochinus lightii Barnard, 1969	gammarid amphipod		X	
Pachycheles rudis Stimpson, 1859 (1960)	thick-clawed porcelin crab		X	
Pachygrapsus crassipes Randall, 1839	shore crab		X	

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Arthropoda (cont.)				
Pagurus granosimanus (Stimpson, 1859)	hermit crab	X		
Pagurus samuelis (Stimpson, 1857)	hermit crab	X		
Pagurus sp.	hermit crab	X	X	
Pandalus danae Stimpson, 1857	coon-stripe shrimp	X		
Parallorchestes anceps	gammarid amphipod		X	
Parallorchestes ochotensis (Brandt, 1851)	gammarid amphipod		X	
Petrolisthes cinctipes (Randall, 1839)	porcellin crab	X	X	
Petrolisthes eriomerus Stimpson, 1871	porcellin crab	X	X	
Phoxichilidium femoratum (Rathke, 1799)	pycnogonid		X	
Phyllolithoides papillosus Brandt, 1849	papillated crab	X		
Pollicipes polymerus (Sowerby, 1833	goose-neck barnacle		X*	
Pugettia producta (Randall, 1839)	kelp crab	X	X*	
Pugettia richii Dana, 1851	kelp crab	X	X	
Scyra acutifrons Dana, 1852	sharp-nosed crab	X	X	
Spirontocaris brevirostris (Dana, 1852)	short-spined shrimp	X	X	
Spirontocaris picta (Stimpson, 1871)	red banded transparent shrimp		X	

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Arthropoda (cont.)				
Unidentified	caprellidae	X	X	
Unidentified	caridea	X		
Unidentified	dipteran larvae		X	
Unidentified	gammeridaceae		X	
Unidentified	isopoda		X	
Unidentified	mysidaceae	X		
Unidentified	pycnogonidaceae		X	
Phylum: Brachiopoda				
Glottidea sp.	lamp shell	X		
Terebratulina sp.	lamp shell	X		
Phylum: Ectoprocta				
Bugula sp.	bryozoan	X		
Diaperoecia californica (d'Orbigny, 1852)	bryozoan	X		
Lichenopora nova-zelandiae (Busk, 1875)	encrusting blue ectoprocta	X		
Phylum: Echinodermata				
Cucumaria miniata Brant, 1835	red sea cucumber	X*		

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Echinodermata (cont.)				
Dermasterias imbricata (Grube, 1857)	leather star	X*		
Eupentacta quinquesemita (Selenka, 1867)	white sea cucumber	X*		
Evasterias troschelii (Stimpson, 1862)	mottled star	X		
Henricia leviuscula (Stimpson, 1857)	red sea star	X*	X*	
Leptasterias pusilla (Fisher, 1911)	six-rayed star		X*	
Leptasterias spp.	six-rayed star	X*	X*	
Mediaster aequalis Stimpson, 1857	vermillion star	X		
Ophioplocus esmarki Lyman, 1874	brittle star	X		
Orthasterias koehleri (Dehoriol)	fragile sea star	X*		
Patiria miniata (Brandt, 1835)	bat star	X*		
Pisaster brevispinus (Stimpson, 1857)	short spined pisaster	X*		
Pisaster giganteus (Stimpson, 1857)	sea star	X*		
Pisaster ochraceous (Brandt, 1835)	ochre star	X*	X*	
Poraniopsis inflata (Fisher, 1910)	sea star	X		
Psolus chitonoides Clark, 1902	sea cucumber	X*		
Pteraster tesselatus arcuatus Fisher, 1911	fat sea star	X		

APPENDIX VII (cont.)

INVERTEBRATES Scientific name	Common name	Subtidal	Intertidal	Pelagic
Phylum: Echinodermata (cont.)				
Pycnopodia helianthoides (Brandt, 1835	sunflower star	X*	X*	
Solaster dawsoni Verill, 1878	twelve-arm sunstar	X*		
Solaster stimpson Verill, 1909	sunstar	X*		
Stichopus californicus (Stimpson, 1857)	sea cucumber	X*		
Strongylocentrotus franciscanus (Agassiz, 1863)	red urchin	X*		
Strongylocentrotus purpuratus (Stimpson, 1857)	purple urchin	X*	X*	
Phylum: Sipunculida				
Phascolosoma agassizii Keferstein, 1866	peanut worm		X	
Phylum: Chordata				
Ascidia paratropa (Huntsman, 1912)	transparent tunicate	X		
Boltenia villosa (Stimpson, 1864)	spiny-headed tunicate	X		
Styela gibbsii (Stimpson, 1864)	peanut tunicate	X		
Styela montereyensis (Dall, 1872)	stalked tunicate	X*		
Unidentified salps	salps			X

* animal quantified either intertidally or subtidally

APPENDIX VII (cont.)

FISH Scientific name	Common name	Subtidal	Intertidal	Pelagic
Ammodytes hexapterus	Pacific sandlance	X		
Anarrhichthys ocellatus	Wolf eel	X		
Anoplagonus inermis	Smooth alligatorfish	X		
Anoplarchus purpurescens	High cockscomb		X	
Anoplarchus sp.	Cockscomb	X		
Apodichthys flavidus	Penpoint gunnel		X	
Artedius corallinus	Coralline sculpin	X		
Artedius fenestralis	Padded sculpin	X		
Artedius harringtoni	Scalyhead sculpin	X	X	
Artedius lateralis	Smoothhead sculpin	X	X	
Ascelichthys rhodorus	Rosylip sculpin	X	X	
Aulorhynchus flavidus	Tubesnout	X		X
BOTHIDAE	Flatfish	X		
Bothragonus swanii	Rockhead	X		
Cebidichthys violaceus	Monkeyface-eel		X	
Chilara taylori	Spotted cusk-eel	X		
Chirolophis nugator	Mosshead warbonnet	X		
Citharichthys stigmaeus	Speckled sanddab	X		

APPENDIX VII (cont.)

FISH Scientific name	Common name	Subtidal	Intertidal	Pelagic
Clinocottus acuticeps	Sharpnose sculpin		X	
Clinocottus analis	Wooly sculpin		X	
Clinocottus embrym	Calico sculpin		X	
Clinocottus globiceps	Mosshead sculpin		X	
Clinocottus recalvus	Bald sculpin		X	
Clupea harengus pallasii	Pacific herring			X
Coryphopterus nicholsii	Blackeye goby	X		
COTTIDAE	Sculpins	X	X	
Damalichthys vacca	Pile surfperch	X		
Embiotoca lateralis	Striped surfperch	X	X	
Enophrys bison	Buffalo sculpin	X	X	
Eopsetta jordani	Petrale sole	X		
Gibbonsia metzi	Striped kelpfish		X	
Gibbonsia montereyensis	Crevice kelpfish		X	
GOBIESOCIDAE	Clingfish	X		
GOBIIDAE	Gobies	X		
Gobiesox maeandricus	Northern clingfish	X	X	
Hemilepidotus hemilepidotus	Red Irish lord	X		
Hemilepidotus spinosus	Brown Irish lord	X	X	
Hexagrammos decagrammus	Kelp greenling	X	X	

APPENDIX VII (cont.)

FISH Scientific name	Common name	Subtidal	Intertidal	Pelagic
Hexagrammos superciliosus	Rock greenling		X	
Hyperprosopon argenteum	Walleye surfperch	X		
Jordania zonope	Longfin sculpin	X		
Lepidopsetta bilineata	Rock sole	X		
Liparis florae	Tidepool snail fish	X	X	
Liparis fucensis	Slipskin snailfish	X	X	
Liparis mucosus	Slimy snailfish	X		
Liparis rutteri	Ringtail snailfish	X	X	
Liparis spp.	Snailfish	X		
Nautichthys oculofasciatus	Sailfin sculpin	X		
Oligocottus maculosus	Tidepool sculpin		X	
Oligocottus rimensis	Saddleback sculpin		X	
Oligocottus rubellio	Rosy sculpin		X	
Oligocottus snyderi	Fluffy sculpin		X	
Oncorhynchus kisutch	Silver salmon			X
Oncorhynchus tshawytscha	King salmon			X
Ophiodon elongatus	Lingcod	X		
Oxylebius pictus	Painted greenling	X		
Pallasina barbata	Tubenose poacher	X		

APPENDIX VII (cont.)

FISH Scientific name	Common name	Subtidal	Intertidal	Pelagic
Pholis shultzi	Red gunnel	X		
Pholis sp.	Gunnel	X		
Phytichthys chirus	Ribbon prickleback	X	X	
Rhacochilus toxotes	Rubberlip surfperch	X		
Rhamphocottus richardsoni	Grunt sculpin	X		
Scorpaenichthys marmoratus	Cabezon	X	X	
Scytalina cerdale	Graveldiver		X	
Sebastes auriculatus	Brown rockfish	X		
Sebastes carnatus	Gopher rockfish	X		
Sebastes caurinus	Copper rockfish	X		
Sebastes chrysomelas	Black & Yellow rockfish	X		
Sebastes entomelas	Widow rockfish	X		
Sebastes flavidus	Yellowtail rockfish	X	X	
Sebastes maliger	Quillback rockfish	X		
Sebastes melanops	Black rockfish	X	X	
Sebastes miniatus	Vermilion	X		
Sebastes mystinus	Blue rockfish	X	X	
Sebastes nebulosus	China rockfish	X		

APPENDIX VII (cont.)

FISH Scientific name	Common name	Subtidal	Intertidal	Pelagic
Sebastes pinniger	Canary rockfish	X		
Sebastes rastrelliger	Grass rockfish	X	X	
Sebastes rosaceus	Rosy rockfish	X		
Sebastes ruberrimus	Turkey-red rockfish	X		
Sebastes serranoides	Olive rockfish	X		
Sebastes spp.	Rockfish	X	X	
STICHAEIDAE	Pricklebacks	X		
Synchirus gilli	Manacled sculpin	X		
Xererpes fucorum	Rockweed gunnel		X	
Xiphister atropurpureus	Black prickleback		X	
Xiphister mucosus	Rock prickleback		X	
Xiphister sp.	Prickleback		X	

APPENDIX VIII

Invertebrate Numbers Recorded at Intertidal Stations-
Zone A * - Central Area - Mendocino Power Plant
Site - June 1972 through February 1973.

Species	Station Date	06 Jun 11 1972	23 Oct 21 1972	04 Feb 16 1973
COELENTERATA				
Epiactis prolifera				1
MOLLUSCA				
ACMAEIDAE		10	16	
Katharina tunicata		7	12	4
Mopalia spp.		15		
Mytilus californianus		11	95	1
Nuttallina californica			58	
Tegula funebralis				19
Tonicella lineata		2	3	
ECHINODERMATA				
Leptasterias spp.		2	7	
Strongylocentrotus purpuratus		26	81	
AREA SAMPLED (m^2):		0.75	1.0	0.25

*Zone 'A' includes the area from +0.9m above MLLW and higher (to approx. +1.8m).

APPENDIX IX

Invertebrate Numbers Recorded at Intertidal Stations - Zone B * Central Area - Mendocino Power Plant Site - November 1971 through January 1972.

Species	Station	23	44	44	54	44	36	48	03
	Date	Nov 2 1971	Nov 3 1971	Nov 29 1971	Nov 29 1971	Jan 15 1972	Jan 26 1972	Jan 27 1972	Jan 29 1972
COELENTERATA									
Anthopleura elegantissima			2	58	33	29			
Anthopleura xanthogrammica					1	8			
Epiactis prolifera			5				17		
MOLLUSCA									
ACMAEIDAE				11	22	7	11		15
Calliostoma costatum			9	1	2			10	
Cryptochiton stelleri			2				2		
Katharina tunicata				10	1	6	3		1
Mopalia spp.				2	2	1	1	1	3
Mytilus californianus				1	2				2
Tegula brunnea			1			2	10	2	
Tegula funebralis				97	37				5
Tonicella lineata		3	4	3	2	8	7		4

APPENDIX IX (Cont.)

Species	Station Date	23 Nov 2 1971	44 Nov 3 1971	44 Nov 29 1971	54 Nov 29 1971	44 Jan 15 1972	36 Jan 26 1972	48 Jan 27 1972	03 Jan 29 1972
ARTHROPODA									
Cancer spp.		1	1						
Loxorhynchus crispatus							1		
Pugettia producta							4	1	2
ECHINODERMATA									
Leptasterias spp.					2	2	1		4
Pisaster ochraceous							4		
Strongylocentrotus purpuratus		7	50		20	113	35	45	81
AREA SAMPLED (m^2):		0.25	1.0	1.0	1.0	0.75	1.0	0.25	1.0

* Zone 'B' includes the area between 0.0 m and +0.9m above MLLW.

APPENDIX X

Invertebrate Numbers Recorded at Intertidal Stations - Zone B * - Central Area - Mendocino Power Plant Site - April 1972 through July 1972.

Species	Station Date	53 Apr 16 1972	59 Apr 15 1972	50 May 14 1972	18 May 15 1972	51 May 15 1972	06 Jun 11 1972	20 Jun 12 1972	32 Jul 11 1972
COELENTERATA									
Anthopleura elegantissima				10		50			
Anthopleura xanthogrammica		1							
Epiactis prolifera				35					1
MOLLUSCA									
ACMAEIDAE			1		1	20		12	7
Calliostoma costatum									1
Cryptochiton stelleri		1						1	1
Katharina tunicata		4				13		12	
Mopalia spp.						3	3		1
Mytilus californianus					6			11	
Tegula brunnea		21		12		29	1		11
Tonicella lineata		1		5		1			6

APPENDIX X (Cont.)

Species	Station	53	59	50	18	51	06	20	32
	Date	Apr 16 1972	Apr 15 1972	May 14 1972	May 15 1972	May 15 1972	Jun 11 1972	Jun 12 1972	Jul 11 1972
ARTHROPODA									
Cancer spp.		1							
Pugettia producta				1				1	1
ECHINODERMATA									
Henricia leviuscula					1				
Leptasterias spp.					1	1		2	4
Strongylocentrotus purpuratus		132		244	82	6	20	51	48
AREA SAMPLED (m^2):		1.0	0.25	0.75	0.5	1.0	0.25	0.75	1.0

* Zone 'B' includes the area between 0.0m and +0.9m MLLW.

APPENDIX XI

Invertebrate Numbers Recorded at Intertidal Stations - Zone B * - Central Area - Mendocino Power Plant Site - October 1972 through February 1973.

Species	Station	31	52	32	47	58	36	36	42	04	49
	Date	Oct 21 1972	Nov 18 1972	Dec 2 1972	Dec 17 1972	Dec 17 1972	Dec 19 1972	Feb 13 1973	Feb 14 1973	Feb 16 1973	Feb 16 1973
COELENTERATA											
Anthopleura elegantissima				3	14	1		12	3		
Ballanophyllia elegans		1	6								
Epiactis prolifera		5	1		17			10	3	2	3
MOLLUSCA											
ACMAEIDAE		4	7		12		4	10		25	6
Calliostoma costatum		1							1		
Katharina tunicata		2	2		3		5	1			4
Mopalia spp.		1		1	3		1	2	1		
Mytilus californianus			3		1		1			27	4
Tegula brunnea		40			8	10	2		6		23
Tegula funebralis		1		36				78	3	64	1
Tonicella lineata		2	1	2	1			2			1

APPENDIX XI (Cont.)

Species	Station	31	52	32	47	58	36	36	42	04	49
	Date	Oct 21 1972	Nov 18 1972	Dec 2 1972	Dec 17 1972	Dec 17 1972	Dec 19 1972	Feb 13 1973	Feb 14 1973	Feb 16 1973	Feb 16 1973
ARTHROPODA											
Balanus cariosus			11								
Cancer spp.			1	2							2
Pugettia producta		6	9		2		18			3	
ECHINODERMATA											
Leptasterias spp.		1	1	8	1	2	3	2		1	4
Pisaster ochraceous				1							
Strongylocentrotus purpuratus		131	44		108		50	29	13	18	104
AREA SAMPLED (m^2):		1.0	1.0	1.0	1.0	0.5	0.75	1.0	0.25	0.75	1.0

* Zone 'B' includes the area between 0.0 m and +0.9m MLLW.

APPENDIX XII

Invertebrate Numbers Recorded at Intertidal Stations - Zone C *
Central Area - Mendocino Power Plant Site - November 1971
through January 1972.

Species	Station	23	54	44	54	33	48
	Date	Nov 2 1971	Nov 3 1972	Jan 15 1972	Jan 15 1972	Jan 26 1972	Jan 27 1972
COELENTERATA							
Anthopleura elegantissima					2	47	2
Ballanophyllia elegans					1		
Epiactis prolifera					13		31
Tealia crassicornis				5	15		
MOLLUSCA							
ACMAEIDAE			18		28	3	12
Archidoris montereyensis							1
Calliostoma costatum					1		
Haliotis rufescens						1	
Hermissenda crassicornis							1
Mopalia spp.							2
Rostanga pulchra					1		1
Tegula brunnea		5			22	8	12

APPENDIX XII (Cont.)

Species	Station Date	23 Nov 2 1971	54 Nov 3 1972	44 Jan 15 1972	54 Jan 15 1972	33 Jan 26 1972	48 Jan 27 1972
MOLLUSCA (Cont)							
Tegula funebralis			31		2	1	
Tonicella lineata		8	2		12	1	5
ARTHROPODA							
Cancer spp.			3		1		
Pugettia producta					2	7	
ECNINODERMATA							
Henricia leviuscula						1	
Leptasterias spp.						2	
Pisaster ochraceous						1	
Pycnopodia helianthoides						1	
Strongylocentrotus purpuratus		105	62	35	11	86	58
AREA SAMPLED (m^2):		0.5	1.0	0.25	1.0	1.0	0.75

* Zone 'C' includes the area lower than 0.0m MLLW.

APPENDIX XIII

Invertebrate Numbers Recorded at Intertidal Stations - Zone C * Central Area - Mendocino Power Plant Site - April 1972 through July 1972.

Species	Station	07	09	59	43	50	18	20	44	38
	Date	Apr 15 1972	Apr 15 1972	Apr 16 1972	May 14 1972	May 14 1972	May 15 1972	June 12 1972	Jul 10 1972	Jul 11 1972
COELENTERATA										
Anthopleura xanthogrammica						1				
Ballanophyllia elegans							5			
Epiactis prolifera			3			5			31	5
MOLLUSCA										
ACMAEIDAE		3	5		3		10	10	3	3
Calliostoma costatum						2			1	
Cryptochiton stelleri			1				1			
Haliotis rufescens			1							
Mytilus californianus							3			
Searlesia dira		2								
Tegula brunnea		4	23		12	12	11		10	31
Tegula funebralis		127	1							

APPENDIX XIII (Cont.)

Species	Station Date	07 Apr 15 1972	09 Apr 15 1972	59 Apr 16 1972	43 May 14 1972	50 May 14 1972	18 May 15 1972	20 Jun 12 1972	44 Jul 10 1972	38 Jul 11 1972
MOLLUSCA (Cont)										
Tonicella lincata					4	3			3	2
ARTHROPODA										
Cancer spp.						1				2
Pollicipes polymerus							1			
Pugettia producta		3			11					1
ECHINODERMATA										
Leptasterias spp.		1			1		1	1		
Strongylocentrotus purpuratus		140	33		56	18	76	43	120	88
AREA SAMPLED (m^2):		1.0	1.0	0.75	1.0	0.25	0.5	0.25	1.0	1.0

* Zone 'C' includes the area lower than 0.0m MLLW.

APPENDIX XIV

Invertebrate Numbers Recorded at Intertidal Stations - Zone C *
Central Area - Mendocino Power Plant Site - December 1972
through February 1973.

Species	Station	58	25	36	42
	Date	Dec 17, 1972	Dec 19, 1972	Jan 16, 1973	Feb 14, 1973
COELENTERATA					
Anthopleura elegantissima			1	5	1
Anthopleura xanthogrammica			2		2
Ballanophyllia elegans				6	
Epiactis prolifera			4	4	33
MOLLUSCA					
ACMAEIDAE			10	12	
Calliostoma costatum				3	
Cryptochiton stelleri			1	1	
Hermissenda crassicornis				2	
Mopalia spp.				1	1
Mytilus californianus			1		
Tegula brunnea		1	18	6	13
Tegula funebralis				2	10

APPENDIX XIV (Cont.)

Species	Station	58	25	36	42
	Date	Dec 17, 1972	Dec 19, 1972	Jan 16, 1973	Feb 14, 1973
MOLLUSCA (Cont)					
Tonicella lineata			7	11	2
ARTHROPODA					
Mimulus foliatus			1		
Pugettia producta				1	
ECHINODERMATA					
Leptasterias spp.		1		1	2
Strongylocentrotus purpuratus		41	38	64	39
AREA SAMPLED (m^2):		0.5	1.0	1.0	0.75

* Zone "C" includes the area lower than 0.0m MLLW.

APPENDIX XV

Invertebrate Numbers Recorded at Intertidal Stations - Zone A *
North Control Area - Mendocino Power Plant Site -
November 1971 through February 1973

Species	Station	33	31	31	33	41	33	31	15
	Date	Nov 30 1971	May 12 1972	Jun 11 1972	Oct 19 1972	Oct 22 1972	Dec 4 1972	Feb 12 1973	Feb 14 1973
COELENTERATA									
Anthopleura elegantissima		2		2	3				10
Anthopleura xanthogrammica					3			1	2
Epiactis prolifera				3					
MOLLUSCA									
ACMAEIDAE		44	56	77	46	28	15	6	101
Katharina tunicata		1	6	1			11		2
Mopalia spp.		47+	22+	14+	2	18+	54+		
Mytilus californianus		112	50	126	1	2	13		32
Nuttallina californica								1	4
Tegula funebralis					2				
Thais emarginata					14				1
Tonicella lineata		2	1				2		
ARTHROPODA									
Balanus sp.							113		
Pollicipes polymerus		7		17			1		53

APPENDIX XV (Cont.)

Species	Station	33	31	31	33	41	33	31	15
	Date	Nov 30 1972	May 12 1972	Jun 11 1972	Oct 19 1972	Oct 22 1972	Dec 4 1972	Feb 12 1973	Feb 14 1973
ECHINODERMATA									
Leptasterias spp.		1	2	1	11	1	9	1	
Strongylocentrotus purpuratus		36	32	67	4		5		
AREA SAMPLED (M^2)		1.0	1.0	1.0	1.0	0.25	1.0	0.25	1.0

* Zone 'A' includes the area from +0.9m above MLLW and higher (to approx. +1.8m)

+ These figures probably include numbers of *Nuttallina californica* earlier misidentified as *Mopalia* sp.

APPENDIX XVI

Invertebrate Numbers Recorded at Intertidal Stations - Zone B *
North Control Area - Mendocino Power Plant Site -
November 1971 through February 1973

Species	Station	25	38	05	11	09	41	10	31	34	42	24
	Date	Nov 30 1971	Dec 1 1971	Apr 17 1972	Apr 17 1972	May 13 1972	Oct 22 1972	Nov 3 1972	Feb 12 1973	Feb 12 1973	Feb 12 1973	Feb 14 1973
COELENTERATA												
Anthopleura elegantissima		172	44	67				7	19	52		34
Anthopleura xanthogrammica			1	3	9			4	2	5	1	
Epiactis prolifera				30			1				10	
MOLLUSCA												
ACMAEIDAE		2	16	12	6	2	5	17	19	15		1
Calliostoma costatum				2								
Katharina tunicata		4	1		6		9	5	5	13	1	
Mopalia spp.			2		3	1	3	5	2		1	
Mytylus californianus			1		3	1	1	4	2	10		
Nuttallina californica									7	30		
Searlesia dira												1
Tegula brunnea				40	8	3	35			2		
Tegula funebralis			94	2					1		28	16
Thais emarginata								5				
Tonicella lineata				2		1	2	1	4	5	1	
ARTHROPODA												
Balanus		6						3		3		

APPENDIX XVI (Cont.)

Species	Station Date	25 Nov 30 1971	38 Dec 1 1971	05 Apr 17 1972	11 Apr 17 1972	09 May 13 1972	41 Oct 22 1972	10 Nov 3 1972	31 Feb 12 1973	34 Feb 12 1972	42 Feb 12 1972	24 Feb 1 197
ARTHROPODA (Cont)												
Cancer spp.							1					
Pugettia producta				2	2	1		1		1		
Tetraclita squamosa										1		
ECHINODERMATA												
Leptasterias spp.						2	1	6		4	3	
Pisaster ochraceous						1					1	
Strongylocentrotus purpuratus		78	3	122	115	82	121	16	76	128	31	18
AREA SAMPLED (M^2)		1.0	1.0	1.0	1.0	1.0	0.75	1.0	0.75	1.0	0.75	0.50

* Zone 'B' includes the area between 0.0m and +0.9m above MLLW

APPENDIX XVII

Invertebrate Numbers Recorded at Intertidal Stations - Zone C *
North Control Area - Mendocino Power Plant Site -
November 1971 through February 1973

Species	Station	12	25	26	40	04	43	25	43	35	38	42	24	44	49
	Date	Nov 5 1971	Nov 5 1971	Jan 28 1972	Jan 28 1972	Jan 29 1972	Apr 18 1972	May 12 1972	May 13 1972	June 11 1972	Dec 18 1972	Feb 12 1973	Feb 14 1973	Feb 15 1973	Feb 15 1973
COELENTERATA															
Anthopleura elegantissima			12		90	1	2				1		77	34	2
Anthopleura xanthogrammica												1			
Epiactis prolifera			12	1	7	21	9	39	2	8	42	1			7
Tealia crassicornis						3									
MOLLUSCA															
ACMAEIDAE		5	30	12	1	10	17	5	10	4	15				
Callicstoma costatum			1		1	6		4					3		
Cryptochiton stelleri							1	1	1		1				
Haliotis rufescens										1					1
Katharina tunicata		1						1			7				
Mopalia spp.		1			1			1			1	3		1	
Rostanga pulchra				1		1									
Searlesia dira													1		
Tegula brunnea		16	15	27	79	6	21	19	33	77	55		6	3	70
Tegula funebralis						19						6		34	30
Tonicella lincata			7	10			2	1	1	6	4		1		1

APPENDIX XVII (Cont.)

Species	Station	12	25	26	40	04	43	25	43	35	38	42	24	44	49
	Date	Nov 5 1971	Nov 5 1971	Jan 28 1972	Jan 28 1972	Jan 29 1972	Apr 18 1972	May 12 1972	May 13 1972	June 11 1972	Dec 18 1972	Feb 12 1973	Feb 14 1973	Feb 15 1973	Feb 15 1973
ARTHROPODA															
Cancer spp.								1							1
Loxorhynchus crispatus				1											
Pugettia producta			2	1			3	2		2					
ECHINODERMATA															
Henricia leviuscula					1										
Leptasterias spp.										4	1			2	3
Pisaster ochraceous						1									
Pycnopodia helianthoides									1						
Strongylocentrotus purpuratus		21	31	144	29	203	18	60	69	96	93	7	63		
AREA SAMPLED (M^2)		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.25	0.5	1.0	1.0

* Zone 'C' includes the area lower than 0.0 m MLLW

APPENDIX XVIII

Dry Weights (gms) of Soft Algae Found at Intertidal Stations Zone A - Central Area - Mendocino Power Plant Site - June 1972 through February 1973.

Species	Station	6	23	4
	Date	Jun 11, 1972	Oct 21, 1972	Feb 16, 1973
RHODOPHYTA:				
Cryptopleura lobulifera		0.5	2.2	
Endocladia muricata				0.5
Halosaccion glandiforme		0.5		
Hymenena multiloba		8.5		
Iridaea flaccida		0.6		
Iridaea sp.				TR
Microcladia borealis		1.4		
Odonthalia floccosa		216.3		30.8
Plocamium pacificum		TR		
Pterochondria woodii		1.2		
CHLOROPHYTA:				
Spongomorpha coalita		TR		
PHAEOPHYTA:				
Heterochordaria abietina		0.7		
AREA SAMPLED (m^2)		0.75	1.0	0.25

APPENDIX XIX

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone B - Central Area - Mendocino Power Plant Site - November 1971 through January 1972.

Species	Station	44	54	Davidson 44	36	48	3
	Date	Nov 29,1971	Nov 29,1971	Jan 15,1972	Jan 26,1972	Jan 27,1972	Jan 29,1972
RHODOPHYTA:							
Botryoglossum farlowianum						0.5	
Cryptopleura lobulifera				2.0		11.6	16.0
Endocladia muricata		40.3	253.3	56.8			
Farlowia mollis					0.7		
Gastroclonium coulteri					11.8		
Gigartina agardhii				0.7			
Gigartina papillata		8.3		1.7	3.5		
Halosaccion glandiforme		163.8		81.3			
Hymenena flabelligera						0.3	6.7
Hymenena multiloba			2.5			1.3	8.8
Iridaea flaccida		10.0	7.4	25.7	19.8	1.9	5.2
Laurencia spectabilis					1.8		

APPENDIX XIX (Cont.)

Species	Station	44	54	Davidson 44	36	48	3
	Date	Nov 29,1971	Nov 29,1971	Jan 15,1972	Jan 26,1972	Jan 27,1972	Jan 29,1972
RHODOPHYTA (Cont.):							
Microcladia borealis			TR				1.7
Odonthalia floccosa			76.4	14.7	20.7	4.4	9.8
Plocamium violaceum				3.4			
Rhodomela larix			114.4				
CHLOROPHYTA:							
Codium fragile					2.2		
Ulva lobata					1.9		
PHAEOPHYTA:							
Heterochordaria abietina		2.1					
AREA SAMPLED (m^2):		0.75	1.0	0.75	0.75	0.25	0.75

APPENDIX XX

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone B - Central Area - Mendocino Power Plant Site - April 1972 through October 1972.

Species	Station	Upwelling								Oceanic
		53	59	50	18	51	6	20	32	31
	Date	Apr 16 1972	Apr 16 1972	May 14 1972	May 15 1972	May 15 1972	Jun 11 1972	Jun 12 1972	Jul 11 1972	Oct 21 1972
RHODOPHYTA:										
Cryptopleura lobulifera		15.0		TR	14.7		27.3	35.3		43.0
Endocladia muricata						26.4				
Gastroclonium coulteri									16.6	
Gigartina californica		5.1				1.0			7.4	
Gigartina canaliculata									2.7	
Gigartina papillata						3.5				
Halosaccion glandiforme		TR		TR		3.0			4.2	1.7
Hymenena flabelligera		7.4								
Hymenena multiloba		3.2								
Iridaea flaccida		16.2	18.8	0.6	0.4	3.0	14.6			4.6
Iridaea splendens									159.0	17.1
Laurencia spectabilis							1.5			TR

APPENDIX XX (Cont.)

Species	Station	Upwelling								Oceanic
		53	59	50	18	51	6	20	22	31
	Date	Apr 16 1972	Apr 16 1972	May 14 1972	May 15 1972	May 15 1972	Jun 11 1972	Jun 12 1972	Jul 11 1972	Oct 21 1972
RHODOPHYTA (cont.):										
Microcladia borealis		13.7		2.4			31.8	1.7	0.5	26.0
Microcladia coulteri								0.3		
Odonthalia floccosa		143.3	0.5	4.3				41.0	3.6	135.0
Plocamium violaceum								0.4		
Polysiphonia sp.						2.1	0.5			
Rhodomela larix		20.6								
Schizymenia pacifica							9.6	7.1		
CHLOROPHYTA:										
Codium fragile									123.8	
Spongomorpha coalita									1.6	
Ulva lobata									11.7	
PHAEOPHYTA:										
Heterochordaria abietina			0.2							
AREA SAMPLED (m^2):		1.0	0.25	0.25	0.50	0.50	0.25	0.75	1.0	1.0

APPENDIX XXI

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone B - Central Area - Mendocino Power Plant Site - November 1972 through February 1973.

Species	Station	52	32	47	58	36	36	42	4	9
	Date	Nov 18 1972	Dec 2 1972	Dec 17 1972	Dec 17 1972	Dec 19 1972	Feb 13 1973	Feb 13 1973	Feb 16 1973	Feb 16 1973
RHODOPHYTA:										
Callithamnion sp.							TR			
Cryptopleura lobulifera		44.0		21.2			TR		1.5	1.9
Endocladia muricata							60.1			
Farlowia mollis							1.8			
Gastroclonium coulteri			113.9				2.5	0.6		
Gelidium coulteri			17.4							
Gigartina agardhii							2.5			
Gigartina californica				TR			1.7			
Gigartina canaliculata			73.4		0.2					
Gigartina cristata			14.3		0.7		0.6	0.7		
Gigartina papillata							2.4		0.4	
Gloiosiphonia californica			17.3							

APPENDIX XXI (Cont.)

Species	Station	52	32	47	58	36	36	42	4	9
	Date	Nov 18 1972	Dec 2 1972	Dec 17 1972	Dec 17 1972	Dec 19 1972	Feb 13 1973	Feb 13 1973	Feb 16 1973	Feb 16 1973
RHODOPHYTA (cont.):										
Halosaccion glandiforme		0.1			0.1		1.0	TR		
Hymenena multiloba				11.3		18.4			8.7	1.2
Iridaea flaccida			15.8	8.0	1.2	4.1	16.7	5.5	1.9	2.9
Iridaea heterocarpum			37.7							
Iridaea splendens		14.6		3.3		0.7				
Laurencia spectabilis									0.9	2.6
Microcladia borealis		1.4		14.2		1.6	0.1		1.5	
Odonthalia floccosa		518.5	1.4	124.8		84.2	20.1	2.2	72.6	26.5
Plocamium violaceum		0.9	0.5			0.4				0.8
Pterosiphonia dendroidea										2.0
Rhodomela larix			15.4		44.7					0.9
Schizymenia pacifica						0.3				
CHLOROPHYTA:										
Ulva lobata			0.7							
AREA SAMPLES (m^2):		1.0	1.0	1.0	0.5	0.75	1.0	0.25	0.75	1.0

APPENDIX XXII

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone C - Central Area - Mendocino Power Plant Site - January 1972.

Species	Station	44	54	33	48
	Date	Jan 15, 1972	Jan 15, 1972	Jan 26, 1972	Jan 27, 1972
RHODOPHYTA:					
Botryoglossum farlowianum		1.6	TR		
Gigartina californica				0.9	
Halosaccion glandiforme			11.2		
Iridaea flaccida			14.0	1.0	
Laurencia spectabilis		2.1	7.8		
Odonthalia floccosa			36.1	45.3	29.1
Rhodomela larix			3.5	3.7	
CHLOROPHYTA:					
Codium fragile				30.1	
Ulva sp.				4.6	
AREA SAMPLED (m^2):		0.25	0.5	0.5	0.25

APPENDIX XXIII

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone C - Central Area - Mendocino Power Plant Site - April 1972 through July 1972.

Species	Station	7	9	59	43	50	18	20	44	38
	Date	Apr 15 1972	Apr 15 1972	Apr 16 1972	May 14 1972	May 14 1972	May 15 1972	Jun 12 1972	Jul 10 1972	Jul 11 1972
					Upwelling					
RHODOPHYTA:										
Cryptopleura lobulifera		0.6			18.6	3.3	7.6		5.2	
Gigartina californica		14.1								
Halosaccion glandiforme		1.3								
Hymenena flabelligera					24.2					0.3
Hymenena sp.								4.6	2.2	
Iridaea flaccida		64.0	15.4	53.7	8.2					
Iridaea sp.		4.5		18.1		1.0				
Laurencia spectabilis		7.4	3.9		2.1				0.2	
Microcladia borealis		1.2			45.0	2.0			5.2	
Microcladia coulteri									7.0	
Odonthalia floccosa		3.7	TR	4.4	38.6					
Polysiphonia californica		1.6	12.2	1.6						
Polysiphonia hendryi			25.0							

APPENDIX XXIII (Cont.)

Species	Station	7	9	59	Upwelling 43	50	18	20	44	38
	Date	Apr 15 1972	Apr 15 1972	Apr 16 1972	May 14 1972	May 14 1972	May 15 1972	Jun 12 1972	Jul 10 1972	Jul 11 1972
RHODOPHYTA (cont.):										
Polysiphonia pacifica			0.2							
Polysiphonia sp.					0.8	1.4			23.2	
Pterochondria woodii		2.1								
Pterosiphonia dendroidea			5.8							0.8
Ptilota hypnoides							0.4			
Rhodomela larix		1.7								
Schizymena pacifica					4.9				5.0	
CHLOROPHYTA:										
Codium fragile										54.8
Ulva sp.										0.3
PHAEOPHYTA:										
Colpomenia sinuosa										TR
AREA SAMPLED (m^2):		0.75	0.75	0.75	1.0	0.25	0.5	0.25	1.0	0.75

APPENDIX XXIV

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone C - Central Area - Mendocino Power Plant Site - December 1972 through February 1973.

Species	Station	Davidson 58	25	36	42
	Date	Dec 17, 1972	Dec 19, 1972	Jan 16, 1973	Feb 13, 1973
RHODOPHYTA:					
Botryoglossum farlowianum					1.7
Cryptopleura lobulifera		0.3	TR		9.7
Gastroclonium coulteri		0.1			
Gigartina canaliculata				19.3	
Gigartina cristata				2.3	0.9
Gigartina papillata		0.1			0.4
Halosaccion glandiforme		TR	TR		
Iridaea flaccida					11.3
Iridaea splendens		0.2	TR	16.9	
Laurencia spectabilis		0.3	0.1	2.3	
Microcladia coulteri		0.1	1.4		
Odonthalia floccosa			0.1	29.0	17.5
Plocamium violaceum		TR			

APPENDIX XXIV (Cont.)

Species	Station	Davidson 58	25	36	42
	Date	Dec 17, 1972	Dec 19, 1972	Jan 16, 1973	Feb 13, 1973
RHODOPHYTA (cont.):					
Prionitis lanceolata			1.5		
Pterochondria woodii					0.8
Pterosiphonia dendroidea					0.5
Rhodomela larix		70.4		23.8	
CHLOROPHYTA:					
Ulva sp.		TR		TR	0.2
AREA SAMPLED (m^2):		0.5	1.0	1.0	0.75

APPENDIX XXV

Dry Weights (gms) of Soft Algae Found at Intertidal Stations - Zone A - North Control Area - Mendocino Power Plant Site - May 1972 through February 1973.

Species	Station	31	33	41	33	31	15
	Date	May 12,1972	Oct 19,1972	Oct 22,1972	Dec 4,1972	Feb 12,1973	Feb 14,1973
RHODOPHYTA:							
Cryptopleura lobulifera		16.6			TR		
Endocladia muricata		3.2	429.7	48.2	8.9	72.4	38.0
Gigartina cristata		0.4	1.9	0.2		TR	3.0
Gigartina sp.						0.7	
Halosaccion glandiforme			7.8	8.5	7.4	0.3	TR
Hymenena multiloba		2.5					
Iridaea sp.			4.1	0.7	3.7		1.8
Microcladia borealis		0.3					
Odonthalia floccosa			84.0		103.2	1.0	29.1
Plocamium pacificum			0.6				
Plocamium violaceum		13.6			5.8		
Porphyra sp.			0.6				
Rhodoglossum affine			0.3				

APPENDIX XXV (Cont.)

Species	Station	31	33	41	33	31	15
	Date	May 12,1972	Oct 19,1972	Oct 22,1972	Dec 4,1972	Feb 12,1973	Feb 14,1973
CHLOROPHYTA:							
Cladophora hemisphaerica			38.4			0.5	6.1
Ulva sp.				0.3			
PHAEOPHYTA:							
Colpomenia sinuosa				0.1			
Heterochordaria abietina			0.8	4.5	TR		TR
AREA SAMPLED (m^2)		1.0	1.0	0.25	1.0	0.25	1.0

APPENDIX XXVI

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone B - North Control Area - Mendocino Power Plant Site - November 1971 through February 1973.

Species	Station	Davidson		Upwelling			Oceanic		Upwelling			
		25	38	5	11	9	41	10	31	34	42	24
	Date	Nov 30 1971	Dec 1 1971	Apr 17 1972	Apr 17 1972	May 13 1972	Oct 22 1972	Nov 3 1972	Feb 12 1973	Feb 12 1973	Feb 12 1973	Feb 14 1973
RHODOPHYTA:												
Constantinea simplex						5.5						
Cryptopleura lobulifera				8.8	44.1	103.7	13.5	12.1		4.6	0.6	
Dilsea californica						2.0						
Endocladia muricata			5.4					78.8	9.4		0.5	
Gastroclonium coulteri											2.2	
Gelidium sp.											0.7	
Gigartina canaliculata											20.6	
Gigartina cristata			6.0									
Gigartina papillata											0.7	
Halosaccion glandiforme			50.5				3.4	0.3				
Hymenena flabelligera				19.6								
Iridaea flaccida			4.1	14.5	2.4						39.0	

APPENDIX XXVI (Cont.)

Species	Station	Davidson 25	Davidson 38	Upwelling 5	Upwelling 11	Upwelling 9	Oceanic 41	Oceanic 10	Upwelling 31	Upwelling 34	Upwelling 42	Upwelling 24
	Date	Nov 30 1971	Dec 1 1971	Apr 17 1972	Apr 17 1972	May 13 1972	Oct 22 1972	Nov 3 1972	Feb 12 1973	Feb 12 1973	Feb 12 1973	Feb 14 1973
RHODOPHYTA (cont.):												
Iridaea splendens								3.3				
Iridaea sp.								0.3				
Microcladia borealis				1.4	0.8	15.4	23.5	6.5		0.3		
Odonthalia floccosa		224.5	13.3	93.9	148.8		183.3	545.4	12.6	TR	28.7	7.5
Plocamium violaceum					0.5				0.2	4.7		
Polysiphonia hendryi				11.1								
Polysiphonia sp.				3.7								
Prionitis linearis						1.5						
Rhodomela larix			216.7		6.5							57.0
CHLOROPHYTA:												
Ulva sp.							0.2					
PHAEOPHYTA:												
Colpomenia sinuosa							TR	0.2				
Heterochordaria abietina			8.5				0.2	0.2	TR			
AREA SAMPLED (m^2)		0.75	1.0	1.0	1.0	1.0	0.75	1.0	0.75	1.0	0.75	0.50

APPENDIX XXVII

Dry Weights (gms) of Soft Algae Found at Intertidal Stations by Oceanographic Period - Zone C - North Control Area - Mendocino Power Plant Site - January 1972 through February 1973

Species	Station	Davidson			Upwelling			Davidson				
		26	40	4	43	25	43	38	42	24	44	49
	Date	Jan 28 1972	Jan 28 1972	Jan 29 1972	Apr 18 1972	May 12 1972	May 13 1972	Dec 18 1972	Feb 12 1973	Feb 14 1973	Feb 15 1973	Feb 15 1973
RHODOPHYTA:												
Amplisiphonia pacifica												0.1
Botryoglossum farlowianum				16.5	2.3				5.5			
Cryptopleura lobulifera			0.4			4.7				4.5	TR	0.3
Farlowia mollis										0.6		
Gastroclonium coulteri					2.8				14.6		6.3	18.9
Gelidium sp.									0.5			0.6
Gigartina canaliculata									12.4			7.2
Gigartina cristata									0.7			0.3
Gigartina papillata										0.2	0.1	1.5
Hymenena flabelligera			0.3			7.5		6.2				
Hymenena multiloba								2.5				1.8
Hymenena sp.		1.0			1.3			3.1				

APPENDIX XXVII (Cont.)

Species	Station	Davidson 26	Davidson 40	Davidson 4	Upwelling 43	Upwelling 25	Upwelling 43	Davidson 38	Davidson 42	Davidson 24	Davidson 44	Davidson 49
	Date	Jan 28 1972	Jan 28 1972	Jan 29 1972	Apr 18 1972	May 12 1972	May 13 1972	Dec 18 1972	Feb 12 1973	Feb 14 1973	Feb 15 1973	Feb 15 1973
RHODOPHYTA (cont.):												
Iridaea flaccida		3.7	6.8		165.3		TR		13.4	4.8		5.7
Laurencia spectabilis		0.8	0.9		23.0			8.1			2.8	7.9
Microcladia borealis					0.7	6.3				0.5		1.4
Microcladia coulteri												2.4
Odonthalia floccosa								114.6				11.7
Opuntiella californica					2.8					9.7		
Plocamium violaceum			2.0									
Polysiphonia californica					24.8							
Polysiphonia hendryii		3.7			20.9*		32.7			0.4		
Pterosiphonia dendroidea			1.0		20.0*							4.7
Ptilota hypnoides						0.2						
Prionitis lanceolata												89.3
Rhodomela larix										1.0	38.6	2.7
Schizymenia pacifica						58.5						
CHLOROPHYTA:												
Spongomorpha coalita							2.5					

APPENDIX XXVII (Cont,)

Species	Station	Davidson 26	Davidson 40	Davidson 4	Upwelling 43	Upwelling 25	Upwelling 43	Davidson 38	Davidson 42	Davidson 24	Davidson 44	Davidson 49
	Date	Jan 28 1972	Jan 28 1972	Jan 29 1972	Apr 18 1972	May 12 1972	May 13 1972	Dec 18 1972	Feb 12 1973	Feb 14 1973	Feb 15 1973	Feb 15 1973
CHLOROPHYTA (cont.):												
Ulva lobata					25.5		1.7			0.1	TR	
Ulva sp.		0.5										
PHAEOPHYTA:												
Colpomenia sinuosa							0.2					
AREA SAMPLED (m^2):		0.25	0.50	1.0	1.0	0.75	1.0	0.75	0.25	0.5	1.0	1.0

* The weight of these two filamentous reds was arbitrarily halved, since physically separating them was a near-impossible task.

APPENDIX XXVIII

Numbers of Fish Collected at Intertidal Ichthyocide Stations - Mendocino Power Plant Site - November 1971 - March 1972.

	Nov 29 1971	Nov 30 1971	Nov 30 1971	Dec 1 1971	Dec 1 1971	Jan 15 1972	Jan 15 1972	Jan 18 1972	Mar 15 1972
Anoplarchus purpurescens	2	1		4	8	1			11
Apodichthys flavidus					9	2			5
Artedius harringtoni						1	1		
Artedius lateralis					18	2			6
Ascelichthys rhodorus		1			1	4			15
Cebidichthys violaceus								1	2
Clinocottus analis									16
Clinocottus embryum	1		2				3		
Clinocottus globiceps	3	3		4	1		6	10	6
Clinocottus recalvus		13							
Clinocottus recalvus-globiceps Complex								67	
COTTIDAE									23
Gibbonsia metzi					1				
Gibbonsia montereyensis					1				

APPENDIX XXVIII (Cont.)

	Nov 29 1971	Nov 30 1971	Nov 30 1971	Dec 1 1971	Dec 1 1971	Jan 15 1972	Jan 15 1972	Jan 18 1972	Mar 15 1972
Gobiesox maeandricus	3			1	1				7
Hemilepidotus spinosus						1			9
Hexagrammos decagrammus						1			16
Hexagrammos superciliosus									3
Liparis florae	1				3	4	1		18
Oligocottus maculosus	9	2			1			128	41
Oligocottus rimensis						1			
Oligocottus rubellio							1		1
Oligocottus snyderi	2	1		7	31	9	24		124
Phytichthys chirus									1
Scorpaenichthys marmoratus					1	2	1		13
Sebastes melanops				1	1				35
Sebastes mystinus					2				2
Sebastes rastrelliger									1
Xererpes fucorum				3	5				6
Xiphister atropurpureus	3	2		5	13	17	2		365

APPENDIX XXVIII (Cont.)

	Nov 29 1971	Nov 30 1971	Nov 30 1971	Dec 1 1971	Dec 1 1971	Jan 15 1972	Jan 15 1972	Jan 18 1972	Mar 15 1972
Xiphister mucosus	1			7	5			2	307
Xiphister sp.									1

APPENDIX XXIX

Numbers of Fish Collected at Intertidal Ichthyocide Stations - Mendocino Power Plant Site - March 1972 - September 1972.

	Mar 16 1972	May 12 1972	May 15 1972	May 15 1972	May 16 1972	Jun 11 1972	Jun 12 1972	Aug 16 1972	Sep 24 1972
Anoplarchus purpurescens	2	1			3			39	16
Apodichthys flavidus	2				22			21	15
Artedius harringtoni	1								1
Artedius lateralis	6				5			2	6
Ascelichthys rhodorus						2			5
Clinocottus analis	1						8	4	
Clinocottus globiceps		1		1	2	9	2	1	1
Clinocottus recalvus-globiceps complex						1	14	2	
COTTIDAE		1	1		6		3	34	4
Embiotoca lateralis					6				
Gibbonsia metzi					1				2
Gibbonsia montereyensis	1				6				
Gobiesox maeandricus						3		100	17
Hemilepidotus spinosus	5				2		5		3

APPENDIX XXIX (Cont.)

	Mar 16 1972	May 12 1972	May 15 1972	May 15 1972	May 16 1972	Jun 11 1972	Jun 12 1972	Aug 16 1972	Sep 24 1972
Hexagrammos decagrammus	4	1		2	22	4	1	1	1
Hexagrammos superciliosus	2				1			1	1
Liparis florae	6	2			2		2		19
Liparis fucensis									1
Liparis rutteri	1								
Oligocottus maculosus	1				1	7	4	10	
Oligocottus rimensis	1				2				
Oligocottus rubellio			1						2
Oligocottus snyderi	14	6	3	5	21	2	139	109	39
Phytichthys chirus					1				
Scorpaenichthys marmoratus	1				6		18	3	1
Sebastes flavidus								1	
Sebastes melanops		1		1	7	1			2
Sebastes mystinus						1	25		
Sebastes spp.					2				

APPENDIX XXIX (Cont.)

	Mar 16 1972	May 12 1972	May 15 1972	May 15 1972	May 16 1972	Jun 11 1972	Jun 12 1972	Aug 16 1972	Sep 24 1972
STICHAEIDAE			1		2		2		
Xererpes fucorum	6				18		13	60	4
Xiphister atropurpureus	40	9	4	5	5	12		81	51
Xiphister mucosus	57			1	5		1	55	15
Xiphister sp.									24

APPENDIX XXX

Numbers of Fish Collected at Intertidal Ichthyocide Stations-
Mendocino Power Plant Site - October 1972 - April 1973.

	Oct 13 1972	Dec 4 1972	Dec 18 1972	Jan 16 1973	Feb 12 1973	Feb 13 1973	Feb 14 1973	Feb 15 1973	Apr 7 1973
Anoplarchus purpurescens	38	8		9	10	8		1	
Apodichthys flavidus	1	4		4	1	2			2
Artedius harringtoni									2
Artedius lateralis	2	2		9	5	13		4	4
Ascelichthys rhodorus				7					2
Clinocottus acuticeps		2							
Clinocottus analis	1								
Clinocottus embryum			1				3		3
Clinocottus globiceps	3	6	1				2		
Clinocottus recalvus-globiceps complex	11						3		
COTTIDAE	3								
Embiotoca lateralis								1	
Enophrys bison		1			1				
Gibbonsia montereyensis					3	15			

APPENDIX XXX (cont.)

	Oct 13 1972	Dec 4 1972	Dec 18 1972	Jan 16 1973	Feb 12 1973	Feb 13 1973	Feb 14 1973	Feb 15 1973	Apr 7 1973
Gobiesox maeandricus	3		1	5	6	4	6	1	9
Hemilepidotus spinosus						1		3	
Hexagrammos decagrammus		2			1			8	1
Hexagrammos superciliosus		1			1		1	8	
Liparis florae	1	3		1	1			9	3
Liparis rutteri		8							
Oligocottus maculosus	254	38		1	2	6		1	
Oligocottus rimensis			1		1	4			6
Oligocottus rubellio				2		1	2		11
Oligocottus snyderi	14	46	8	30	30	49	8	3	7
Phytichthys chirus				1					1
Scorpaenichthys marmoratus		4		1		8			1
Scytalina cerdale			2						9
Sebastes melanops		4			2	1		18	2
Sebastes rastrelliger								2	
Xererpes fucorum					2	4			
Xiphister atropurpureus		2	16	57	59	11	8	81	17

APPENDIX XXX (Cont.)

	Oct 13 1972	Dec 4 1972	Dec 18 1972	Jan 16 1973	Feb 12 1973	Feb 13 1973	Feb 14 1973	Feb 15 1973	Apr 7 1973
Xiphister mucosus	16	19	1		57	3		90	
Xiphister sp.	9								

APPENDIX XXXI

Numbers of Fish Collected at Subtidal Ichthyocide Stations - Mendocino Power Plant Site - March 1972 - April 1973.

	Mar 17, 1972 (13.7-15.3m)	Aug 15, 1972 (9.2-12.2m)	Aug 17, 1972 (12.2-15.3m)	Apr 6, 1973 (9.5m)	Apr 8, 1973 (8.5-9.2m)	Apr 9, 1973 (7.9-8.8m)
AGONIDAE		1				
Ammodytes hexapterus			6			
Anoplagonus inermis		1				
Anoplarchus sp.		2	28		2	
Artedius corallinus		2	1			
Artedius corallinus-lateralis complex		3				
Artedius fenestralis	1	1	23	1		
Artedius harringtoni	1	102	109	1	2	14
Artedius lateralis		1				
Ascelichthys rhodorus		6	7	2		
Bothragonus swanii		3	10			
Chilara taylori			3			
Chirolophis nugator	1	9	55			2
Citharichthys stigmaeus			10			

APPENDIX XXXI (Cont.)

	Mar 17, 1972 (13.7-15.3m)	Aug 15, 1972 (9.2-12.2m)	Aug 17, 1972 (12.2-15.3m)	Apr 6, 1973 (9.5m)	Apr 8, 1973 (8.5-9.2m)	Apr 9, 1973 (7.9-8.8m)
Coryphopterus nicholsii		1				
COTTIDAE		5	1		1	2
Enophrys bison		1	12			1
Gobiesox maeandricus						2
Hemilepidotus spinosus	7	59	130	5	5	26
Hexagrammos decagrammus	1	3	3			4
Jordania zonope		3	4		10	12
Liparis florae		4	3			
Liparis fucensis	1	15	70	3	1	9
Liparis mucosus	1	1	7			
Liparis rutteri			1			
Liparis spp.		3	5			
Nautichthys oculofasciatus			3			
Oxylebius pictus		2				
Pallasina barbata			1			
Pholis schultzi		6	4			

APPENDIX XXXI (Cont.)

	Mar 17, 1972 (13.7-15.3m)	Aug 15, 1972 (9.2-12.2m)	Aug 17, 1972 (12.2-15.3m)	Apr 6, 1973 (9.5m)	Apr 8, 1973 (8.5-9.2m)	Apr 9, 1973 (7.9-8.8m)
Phytichthys chirus		2				
Rhamphocottus richardsoni		2	2			1
Scorpaenichthys marmoratus	2	2	7			
Sebastes chrysomelas					1	
Sebastes flavidus		5	10			
Sebastes melanops			7			1
Sebastes mystinus		20			2	1
Sebastes pinniger			2			
Synchirus gilli			7			

APPENDIX XXXII

Skiff Catch Per Hour - Mendocino Power Plant Site - 1972.

Central

	Total *		Black rockfish		Canary rockfish		Copper rockfish		Vermilion rockfish		Lingcod		Cabezon	
Hours	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H
11.4	21	1.84	8	.70	0		0		0		12	1.05	0	
4.0	4	1.00	1	.25	0		0		0		2	.50	0	
3.0	4	1.33	1	.33	0		0		0		2	.67	1	.33
15.0	21	1.40	2	.13	1	.07	9	.60	0		2	.13	0	
10.0	9	.90	0		0		0		0		2	.20	4	.40
5.0	10	2.00	2	.40	0		0		0		2	.40	5	1.00
2.5	1	.40	0		0		0		0		0		0	
6.0	17	2.83	5	.83	0		0		0		1	.17	7	1.17
16.5	11	.67	8	.48	0		2	.12	0		1	.06	0	
19.2	3	.16	2	.10	1	.05	0		0		0		0	
1.0	2	2.00	0		0		0		0		1	1.00	0	
16.0	16	1.00	0		0		12	.75	0		0		1	.06
6.0	24	4.00	8	1.33	1	.17	5	.83	0		8	1.33	1	.17
10.0	10	1.00	6	.60	2	.20	1	.10	0		0		0	
36.2	14	.39	3	.08	0		6	.16	0		2	.06	1	.03

APPENDIX XXXII (Cont.)

	Total		Black rockfish		Canary rockfish		Copper rockfish		Vermilion rockfish		Lingcod		Cabezon	
Hours	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H
Central (cont.)														
7.5	1	.13	1	.13	0		0		0		0		0	
2.0	2	1.00	1	.50	1	.50	0		0		0		0	
3.0	8	2.67	2	.67	0		2	.67	1	.33	3	1.00	0	
16.0	22	1.38	3	.19	0		6	.38	0		1	.06	3	.19
16.5	61	3.70	15	.91	0		8	.48	4	.24	28	.70	3	.18
North Control														
3.0	39	13.00	2	0.67	3	1.00	6	2.00	2	0.66	10	3.33	0	0.00
6.0	2	0.33	0	0.00	0	0.00	1	0.17	0	0.00	1	0.17	0	0.00
19.5	41	2.10	34	1.74	1	0.05	1	0.05	0	0.00	4	0.20	1	0.05
20.8	35	1.68	11	0.53	3	0.14	3	0.14	2	0.10	9	0.43	3	0.14
13.5	54	4.00	2	0.15	1	0.07	7	0.52	12	0.89	31	2.30	1	0.08
South Control														
5.0	19	3.80	0	0.00	1	0.20	8	1.60	0	0.00	5	1.00	1	0.20
6.0	2	0.33	1	0.17	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1.0	2	2.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.0	10	5.00	2	1.00	0	0.00	1	0.50	0	0.00	6	3.00	0	0.00
12.8	2	0.16	0	0.00	0	0.00	0	0.00	0	0.00	1	0.08	1	0.08

APPENDIX XXXII (Cont.)

	South Control (cont.)													
	Total		Black rockfish		Canary rockfish		Copper rockfish		Vermilion rockfish		Lingcod		Cabezon	
Hours	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H	Fish	C/H
3.6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6.0	66	11.00	2	0.33	10	1.67	18	3.00	5	0.83	10	1.67	1	0.17
4.5	5	1.11	0	0.00	0	0.00	0	0.00	2	0.44	2	0.44	0	0.00
24.0	23	0.96	10	0.42	0	0.00	0	0 00	0	0.00	10	0.42	0	0.00
15.0	51	3.40	11	0.73	1	0.07	2	0.13	2	0.13	5	0.33	23	1.53

*Total includes all fish caught.