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MENDOCINO POWER PLANT SITE ECOLOGICAL STUDY ANNUAL REPORT

July 1, 1971 to December 31, 1972

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This first annual report covers all work from September 1971 through December 1972.

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MENDOCINO POWER PLANT SITE ECOLOGICAL STUDY [1/]

ANNUAL REPORT

July 1, 1971 to December 31, 1972

INTRODUCTION

This annual report covers the first 18 month period of the project from July 1, 1971 through December 31, 1972. The report includes results (discussion and tables) of our subtidal, intertidal, sportfishery, fish collection, fish food habit, and plankton studies. The quarterly report for October 1 to December 31, 1972 is included herein and these data are incorporated in this annual report.

OPERATIONS

July 1 to December 31, 1972

A large portion of our time, during the initial six months, was devoted to filling positions, ordering equipment, and designing and testing various surveys. We conducted three reconnaissance surveys, one subtidal and two intertidal, for a total of 39 man-days at the site (Appendix A). A total of 12 subtidal and 14 intertidal stations was surveyed.

January 1 to December 31, 1972

We finalized our survey designs early in January. The detailed survey methods will be described in the appropriate sections of this report. The study area was separated into the central or outfall area, which included Point Arena Cove from the pier to a point west of the Loran Station (Appendix B); and a control area (North Control) from just south of Sea Lion Rocks to the Point Arena lighthouse. A separate South Control Area was established for our abalone sportfishery studies from Point Arena

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pier south to and including the Soldani Ranch (Appendix C).

During the year we spent 408 man-days at the site. A total of 107 subtidal and intertidal stations was surveyed. Weather and sea conditions during the latter half of the year prevented us from completing any significant subtidal work, and on several occasions, hampered intertidal surveys; 34 boat-days were lost due to unsafe weather conditions.

SUBTIDAL SURVEYS

Methods

A brief description of our subtidal survey methods is included here, more detailed descriptions have been presented in previous quarterly reports. During the pre-survey study conducted in September 1971, we utilized a 30 m transect line, each diver counting all macroinvertebrates and brown algae observed within one meter of each side of the line; estimates were made of the numbers of fish. Counts of the plants and animals were recorded on plastic sheets, in addition the divers recorded observations on depth, visibility, temperature and description of the substrate.

In December 1971, we changed our survey techniques. Instead of running a 30 m linear transect, we substituted the 30 m^2 arc method.

Results

From September 1971 through December 1972, we occupied 63 stations; 12 during the 1971 Oceanic Period, 8 during the 1971-72 Davidson Current Period, 41 during the 1972 Upwelling Period and 2 during the 1972 Oceanic Period (Tables 1, 2, & 3).

September 1971 Survey

The 1971 Oceanic Period diving survey was conducted as a pre-survey and will be discussed separately. All of the stations occupied were in the Central Area; depths ranged from 15 to 72 feet and underwater visibility ranged from 10 to 30 feet. *Laminaria setchelli* was the most numerous and most frequently observed brown algae (Table 1). Red sea urchins, *Strongylocentrotus franciscanus*, were the most abundant and most frequently observed invertebrate. Purple urchins, *Strongylocentrotus purpuratus*, were the second most abundant animal but occurred at only two stations. Red abalone, *Haliotis rufescens*, were third in abundance, but ranked fourth in frequency of occurrence (6 stations). The sun star, *Pycnopodia helianthoides*, and starfish, *Henricia leviuscula*, tied for second in frequency of occurrence (9 stations), while the starfish, *Pisaster brevispinus*, and pinto abalone, *Haliotis kamtschatkana*, each occurred at 7 stations and thus were the third most frequently observed animal.

1972 Surveys

A comparison between oceanographic periods for the two study areas yielded the following: In the Upwelling Period in the Central Area, *Laminaria* was found at more stations and at a greater average density than other algal species; *Desmarestia* was the most commonly observed with respect to total stipes and average density (Table 2). In the Upwelling Period in the North Control Area, *Laminaria* was found at more stations than any other algae, but *Desmarestia* was found at a greater average density per station (Table 3).

In contrast to the algae species, there was no noticeable change in density of invertebrate species per station with the changing oceanographic conditions. Red urchins were observed at nearly every station and were very numerous. *Pisaster brevispinus* was found at approximately half the stations; *Henricia* was observed in fair numbers at nearly every station. *Eupentacta* was noted in fair numbers during the Upwelling Period (100 individuals at one station) but the small sample size of stations in other oceanographic periods makes it difficult to compare observed occurrences. Other echinoderms were observed but in generally small numbers and with scattered distribution. Eight flat abalone were seen, four from each area; 61 pinto abalone were seen at a total of 21 stations. Red abalone were also seen at approximately half the stations occupied at an average density of 5 individuals per station. There were no observable differences in invertebrate species composition between the North Control and Central Areas, and no species was found in only one area (Tables 2 and 3).

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 = 0-25 feet, mid-range = 26-50 feet, deep = 51-75 feet. 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 (Tables 4, 5 and 6).

Nereocystis was found only in traces at shallow and mid-range depths in the North Control Area; it was found primarily in the shallow and mid-range stations of the Central Area (principally within Arena Cove). *Laminaria* was the only algal species observed at the deep stations and was seen in very low numbers there; the average density in the shallow

and mid-range depths for the Central Area was high at 39 stipes per station and 33 stipes per station for the North Control Area. The density for the mid-range stations was slightly less in both areas than for the shallow stations, indicating that while *Laminaria* does occur at all three depth ranges, it is most dense at the shallower depth ranges. *Desmarestia* had a slightly greater density per station observed than *Laminaria* except at the Central Area mid-range depths; *Laminaria* however occurred at more stations than *Desmarestia* except at the shallow stations of the North Control Area. *Pterygophora* was most commonly observed in the shallow regions but was also fairly well represented in the mid-range of the Central Area. *Cystoseira* also was most common at the shallow regions and was less common at the mid-range depths (Tables 5 and 6).

Some trends with respect to invertebrate depth distribution are apparent when the subtidal station data is displayed according to depth ranges. Red urchins, the most commonly encountered species, were well distributed throughout the depth ranges but were most densely arrayed at the mid-range depths for both areas. Purple urchins were most dense at the shallow stations, with only a few individuals being observed at the mid-range. *Henricia* was the only starfish commonly encountered; it was found at all depth ranges in both areas but showed a preference for deeper stations. The other stars were not so frequently observed, but some distributional trends are: *Pycnopodia* appeared most often at the shallower stations; *Pisaster brevispinus* preferred the deeper stations but was found at all depths; *Pisaster ochraceous* was observed infrequently but most often at shallow depth. *Dermasterias*, *Pisaster*

giganteus, both species of *Solaster* and *Orthasterias* were observed only incidently and no clear pattern was discernible. *Stichopus* was rarely observed, *Cucumaria* was universally distributed and *Eupentacta* was universally distributed but showing a strong preference for shallower depths.

Loxorhynchus, the only crustacean commonly observed, was distributed throughout all depths and areas but showed a slight preference for the mid-range and deep stations.

Pinto abalone were observed at the deeper stations; flat abalone were sparsely found at the shallow stations; red abalone were heavily distributed at the shallow stations and well represented at the mid-ranges. *Hinnites* was seen only occassionally. *Cryptochiton* was found universally but with a strong preference shown for the shallow depths.

The red abalone has been reported from various water depths off California. In general, it is found deeper in the 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 our study than in the mid-depth range. The mid-range densities of 6 and 3 individuals per station in the Central and North Control Areas respectively, might indicate that the Central Area had more prime areas of red abalone habitat. The densities for the shallow stations coupled with our observations of the abalone sportfishery might indicate that sportfishermen have made some impact on the population of red abalone. In the relatively inaccessible North Control Area the average density per station was 11 individuals; in the much more accessible Central Area the average

density was 8 red abalone per shallow station. Abalone were measured whenever possible; flat abalone ranged from 55 to 115 mm in length; pinto abalone ranged from 30 to 115 mm and red abalone ranged from 50 to 225 mm. (Figure 2).

During October 1972, we occupied 8 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 7). The most important observation is the correspondingly high abundance of red abalone and kelp at Station 3 and the total absence of red abalone and low abundance of kelp at Station 4.

Otherwise, the observed structure of the invertebrate community did not change drastically in the reconnaissance stations from the comments made previously about general abundance and depth distribution of species from the randomly selected subtidal stations. Red urchins were very common; the stations were too deep for purple 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 reconnaissance stations.

Red Algae

Although less emphasis was placed on sampling subtidal red algae, we feel that the 17 stations sampled reveal the dominant forms (Tables 8 and 9) and depict the generalized patterns of species stratification

by depth (Table 10). A total of 22 genera (one unidentified), representing 29 species was found in the samples.

By frequency of occurrence, there are five genera of soft red algae which must be considered dominant in the subtidal. These are: *Botryoglossum*, *Callophyllis*, *Constantinea*, *Opuntiella*, and *Polyneura*. Together these genera compose 73.2 percent of the sampled biomass in the Central and North Control subtidal areas.

The shallowest zone, 0 to 25 feet, yielded the highest average biomass, 29.73 g/quadrat, with a total of 17 algal species. The midzones, 26 to 50 feet, showed a lower average biomass, 11.25 g/quadrat, but had 21 species. Only one station was occupied in the deepest zone, 51 to 75 feet, and showed a biomass of 2.80 g/quadrat composed of four species.

INTERTIDAL SURVEYS

Methods

Although the methods for occupying an intertidal transect have been described in detail in previous quarterly reports, a brief description seems warranted here. A 30 meter line with 1 meter increments was laid as close to the water level as sea swell and topography would permit. The level on which the line ran was usually maintained at a constant height. A 1/4 m^2 metal quadrat was placed on the substrate at 4 randomly selected points along the line. Within each quadrat all non-cryptic macro-invertebrates (with the notable exception of sponges, hydroids, annelids and bryozoans) and the larger brown algae were identified and counted. The soft red, green and 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 plastic sheet: quadrat number, time at collecting, approximate height relative to tidal

level, counts of invertebrate and brown algae species, and an estimation of percent cover by articulated coralline algae.

The soft algae were scraped in order to determine their specific biomass (dry weights) in the sampled areas. In the laboratory, the algae samples were either placed in formalin to be worked up at a later date, or preferably, worked up fresh. "Working up" entails washing the sample in fresh water to remove associated detritus, draining, sorting to species, obtaining a 'wet' weight, and after a minimum period of 24 hours in a drying oven at 60° to 70°C, obtaining a dry weight for each species. Weights were measured on a triple beam balance to the nearest tenth of a gram.

Results

Intertidal Invertebrates

A total of 34 species of invertebrates were quantified at 214 1/4m^2 quadrats from November 1971 through December 1972. No significant differences are evident in the comparison of numbers and frequency of occurrence and mean numbers per quadrat by oceanographic period (Tables 11 and 12), however, further statistical analysis will be necessary to confirm this. The four most numerous species in the Central Area were the purple sea urchin, *Strongylocentrotus purpuratus;* the black and brown turban snails, *Tegula funebralis,* and *T. brunnea,* and the anemone, *Anthopleura elegantissima.* In the North Control Area the purple sea urchin was also dominant, followed by limpets, *Acmaea* spp., and the brown turban snail. The most frequently observed animals in both areas were purple sea urchins, limpets and the brown turban snail respectively. Major differences are apparent when the two study areas are divided into semi-arbitrary zones (Tables 13 and 14). Our Zones, labeled A, B, and C, corespond roughly to Ricketts & Calvin's Zones 2, 3, and 4; 'A' including the intertidal from +3.0 feet above mean

lower low water to approximately +6.0 feet, Zone 'B' encompassing the area from 0.0 to +3.0 feet and Zone 'C' representing the area exposed below 0.0 water. Like all zonation schemes, this too, has its limitations but aids greatly in evaluating the data. While a detailed analysis of the data will not be presented until the final report, some of the patterns that emerge from the figures will be discussed.

The purple urchin, *Strongylocentrotus purpuratus*, is by far the dominant animal in both study areas. The urchin represents a significant percentage of the total intertidal invertebrate community; from a low of 13.2% in Zone 'A' of the North Control Area to a high of 58.7% in Zone 'C' of the Central Area. Overall, this urchin makes up 47.6% of all the invertebrates counted in all zones of both study areas and occurs with an average frequency of 81%. Except for Zone 'A' of the Central Area, where only 7 samples were taken, the purple urchin frequencies and means increase as one proceeds from the high intertidal to the low intertidal.

Other commonly occurring invertebrates found in both study areas are: *Anthopleura elegantissima*, *Epiactis prolifera*, *Pugettia producta*, *Acmaea* spp., *Katharina tunicata*, *Mopalia* spp., *Mytilus californianus*, *Tegula brunnea*, *Tegula funebralis*, *Tonicella lineata* and *Leptasterias* spp. Together, these animals occur in all three zones with numbers of abundance and frequencies which appear sufficient to be used as indices of biological change.

While there are fewer invertebrate species in Zone 'A', the highest average numbers occur here; about 50 organisms per quadrat in the two study areas. This compares to Zone 'B' averages of 32.6 and 45.0 animals per quadrat in the Central and North Control Areas, respectively, and Zone 'C' averages of 33.2 and 39.6 animals for the respective areas.

Intertidal Algae

For each stratified intertidal zone the average dry weight in grams and the percent frequency of occurrence of each algal species found in the Central and North Control Areas have been summarized (Tables 15, 16, and 17). The algae from the stratified zones of each area have been grouped together for purposes of comparison and each zone is considered individually.

Zone 'A', the intertidal higher than +3.0 feet was the highest stratum considered. The stations occupied were on or near the edge of high intertidal benches and the data derived is representative only of the edge area. Since this zone is exposed to great environmental extremes due to its frequent exposure, our main emphasis was directed to the lower zones. A total of 19 quadrat/stations was examined in this zone (Table 15): Six in the Central Area and 13 in the North Control Area. The six samples in the Central Area are probably not adequate to fully describe algal occurrence and abundance, but the 13 samples from the North Control Area, seem to us to represent a more "real" situation. That is, those algae which occurred in more than 20 percent of the samples are the commonly encountered forms, and those genera with the highest occurrences, *Odanthalia*, *Endocladia*, *Cladophora*, *Halosaccion*, and *Iridaea*, are certainly the dominant algae. By weight, *Endocladia muricata* and *Odanthalia floccosa* represent 85 percent of the total biomass in this zone.

Zone 'B', the mid-zone of the intertidal, ranges from 0.0 to +3.0 feet. A total of 82 quadrats from the two areas was examined (Table 16). Thirty-six species of algae (not including the articulated corallines and large browns) occurred in the samples and of these, 14 species co-occurred in the two study areas. Of the remaining 22 species (those not co-occurring) only five (all from the Central Area) are found with a greater than 10 percent frequency. The total average biomass

figures for the two areas are reasonably comparable; 55.2 g/¼m^2 in the Central Area and 72.1 g/¼m^2 in the North Control Area.

The dominant algae in this zone is, by a great measure, *Odanthalia floccosa*. In the Central Area, *Odanthalia* averaged 20.4g dry weight per quadrat, occurred in 57 percent of the samples, and represented 37 percent of the total average biomass. In the North Control Area, *O. floccosa* averaged 46.5g dry weight per quadrat, occurred in 71 percent of the samples, and represented 64.5 percent of the total average biomass. Other common co-occurring species in the two areas were: *Cryptopleura lobulifera, Endocladia muricata, Halosaccion glandiformis, Irdaea flaccidum, Microcladia borealis,* and *Rhodomela Larix*. Together, these algae represent 37.5 percent and 31.2 percent of the total average biomass in the Central and North Control Areas, respectively. When these six species are combined with *Odanthalia floccosa,* they dominate Zone 'B', representing 74.5 percent of the total average biomass in the Central Area and 95.7 percent in the North Control Area.

Zone 'C' represents that part of the intertidal between 0.0 and -2.0 feet. A total of 56 quadrat/stations from the two study areas were examined (Table 17): 35 from the Central Area and 21 from the North Control Area. Thirty-three species of algae were found in the samples from the two areas and 15 of these were co-occurring. Of the remaining 18 (not co-occurring), only four were found with a frequency of greater than 10 percent. On the basis of total average biomass, Zone 'C' is the least productive (or perhaps sustains the most grazing) of the three zones studied. With average dry weight figures of 22.7 g/quadrat and 27.4 g/quadrat for the Central and North Control Areas, respectively, Zone 'C' showed about 40 percent of the algal biomass found in Zone 'B'.

The dominant species in this zone were *Iridaea flaccidum* (19.8 percent of the biomass in the Central Area and 30.7 percent in the North Control Area) and *Odanthalia floccosa* (19.8 percent of the biomass in the Central Area and 20.1 percent in the North Control Area). Other common co-occurring species were: *Cryptopleura lobuliferum*, *Hymenena* spp., *Laurencia spectabilis*, *Microcladia borealis*, *Polysiphonia* spp., *Pterosiphonia dendroidea* and *Ulva* spp.

Intertidal Brown Algae

The seasonality and zonation of the large intertidal brown algae show up well in the sampling. Although there is only poor correlation between similar species in the two study areas, when considered together the data show a generalized pattern for the intertidal browns. For example, during the Davidson Period, when winter storms take their toll, the browns are at their lowest numbers (Table 18). During the Upwelling Period, roughly from April through July, the brown algae are at their peak numbers. During the Oceanic Period numbers appear to be intermediate to the other two periods. The zones in which the browns occur and their abundances over the sampling period also have been demonstrated in the samples (Table 19). Zone 'A' yielded the lowest number of species. Zone 'C' had the highest number of species, but number of plants per quadrat was lower than observed in Zone 'A'.

Articulated Corallines

Species of the articulated coralline genera *Calliarthron*, *Bossiella* and *Corallina* are extremely common in all three zones in both study areas. The mean estimated percent cover by articulated corallines in the Central and North Control Areas has been delineated (Table 20). Although there seems to be little or no correlation of coralline abundance by oceanographic periods, there appears to be a definite correlation of abundance by intertidal position. Articulate corallines increase in both percent cover

and frequency of occurrence with increased height in the intertidal. Zone 'A' has the highest average frequency and highest percent mean cover: 80% and 27.8%, respectively. Zone 'B' is next with a frequency of 53.1% and an average cover of 12.9%. Zone 'C' is lowest in both categories: 42.2% frequency and 8.9% average cover.

FISHES

Within our overall study, this group of organisms logically separated into three categories; intertidal, subtidal, and diver-observed fishes. Intertidal and subtidal fishes were collected by use of an ichthyocide, Chem Fish Collector, and were identified and analyzed in the laboratory. Data on life histories of many species is being compiled and will be incorporated in the final report. The three subsections relating to fishes are considered below.

Intertidal Fishes

During the six quarters considered in this report, a total of 20 intertidal ichthyocide stations were completed (Table 21). Eleven families and 35 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 most important families of intertidal fishes were: Cottidae, Stichaeidae, and Pholididae.

Collection sites varied from small urchin dominated "pot-holes" to relatively large surge channels and from water levels as high as +4.0 feet above zero to sills at -2.0 feet below zero. The number of species taken during collections varied from a single cottid species (an atypical collection) to 23 species. The mean number of species per station was 10.85.

The following nine species are listed based upon an index of abundance and notes on several other species are given.

1. *Oligocottus snyderi* - Fluffy sculpin.

This cottid was the most frequent species encountered (90%), although second numerically. Its presence in the intertidal should be considered as ubiquitous, often occurring in relatively large numbers, even in small pools.

2. *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, principally cobble substrate. *X. atropurpureus* co-occurred with *X. mucosus* at 10 (50%) stations, indicating a similar niche preference. *X. atropurpureus* is possibly adapted for smaller pools and space that is more restrictive than *X. mucosus*.

3. *Xiphister mucosus* - Rock prickleback.

This species is an extremely important intertidal form and represents the largest herbivore commonly encountered. We are able to distinguish between *X. mucosus* and *X. atropurpureus* down to 20 mm, however identification of these congeners below this size is extremely difficult.

4. *Oligocottus maculosus* - Tidepool sculpin.

Although third numerically, the tidepool sculpin was taken less frequently than such fishes as *Anoplarchus purpurescens*, *Clinocottus globiceps*, *Liparis florae*, *Oligocottus snyderi*, and the two *Xiphister* species. Its high ranking is partially the reflection of two large collections (128 and 41 specimens) and this sculpin should be considered of lesser importance as an indicator species.

5. *Anoplarchus purpurescens* - High cockscomb.

This stichaeid normally is not collected in large numbers but does occur with regularity. It is often taken from pools containing articulated corraline algae; this algal-type perhaps providing habitat for this fish as well as the food items it utilizes.

6. *Clinocottus globiceps* - Moss head sculpin.

Although ninth numerically, this sculpin occurs frequently in the intertidal (80%), especially in the higher tidal zones. Our largest collections have come from pools above +2.0 feet. No particularly large collections of post-juveniles or adults of this species were made, however if larvae (see *Clinocottus globiceps-recalvus* complex below) were added to this category, a change in the ranking of this species would be noted (this is probably a valid assumption). The bald sculpin, *C. recalvus*, the congener most likely to be confused with the mosshead sculpin, was taken at only one station (13 specimens). The mosshead sculpin should be considered as a good indicator species.

7. *Liparis florae* - Tidepool snailfish.

This species of snailfish is by far the most important intertidal representative of its family. At two stations it was collected in relatively large numbers (18 and 19) but it normally is taken in lesser numbers.

8. *Hexagrammos decagrammus* - Kelp greenling.

It appears that the kelp greenling utilizes the intertidal environment during its early life history. However, this species may not be an obligatory resident as small individuals are also commonly noted by divers in the subtidal.

9. *Apodichthys flavidus* - Penpoint gunnel.

The penpoint gunnel, along with the other intertidal pholidid,

Xererpes fucorum (the rockweed gunnel), appear to be associated with pools containing surf grass, *Phylospadix*. Two large collections (22 and 15 specimens) were made.

Other Species:

1. *Clinocottus globiceps - recalvus* complex.

Identification to species level for members of this complex is impossible in specimens less than 35 mmSL. Hence, these larval cottids are grouped together although the majority are in all probability *Clinocottus globiceps*, the mosshead sculpin.

2. *Scorpaenichthys marmoratus* - Cabezon.

The cabezon spends its early life stages in tide pools after a pelagic existence. This fish should be considered as an important indicator species.

3. *Gobiesox maeandricus* - Northern clingfish.

Although not taken in large numbers, the northern clingfish should be considered an important indicator species. The frequency of occurrence of this species (40%) may better exemplify its role as an intertidal form.

4. *Sebastes melanops* - Black rockfish.

Juvenile black rockfish may be using large tidepools as nursery areas. Only young-of-the-year fish have been taken in the intertidal. Larger and older individuals move into the subtidal where they are commonly observed by our divers.

5. *Sebastes mystinus* - Blue rockfish.

Statements regarding the black rockfish (see above) also apply to this species. Off Pt. Arena, the "blue" is less important than the black rockfish, as indicated by the sportfish catch data.

Subtidal Fishes

A total of three subtidal fish collecting stations was completed (Table 22); the first of limited success, the other two extremely productive in terms of species diversity and numbers. The three sites ranged from 30 to 50 feet in depth, with one station 30 to 40 feet and the other two 40 to 50 feet. The number of fish per station was: 15, 265 and 529. Although only 15 specimens were taken on our first collection, eight species were represented. Five of the eight species taken were among the most common fishes when all three stations were combined, indicating that although the number of fishes was low (15) the collection was representative. Cottid fishes were the dominant group with 13 species represented from this family; numerically, 503 of the 809 fishes were cottids. Other important subtidal groups included Agonidae (4 species, 16 specimens); Liparididae (4 species, 97 specimens); Scorpaenidae (4 species, 44 specimens); and Stichaeidae (3 species, 97 specimens).

The six most important species are discussed below:

1. *Artedius harringtoni* - Scalyhead sculpin.

This cottid was taken in about equal numbers from the two larger collections (102 and 109). *A. harringtoni* is occasionally taken in the low intertidal, however it is not truly an intertidal form. This cottid is probably commonly observed by divers and recorded as "*Artedius*-type cottid"; its small size precluding positive identification. When collected, the orangish branchiostegal region on this beautiful fish is an excellent field character.

2. *Hemilepidotus spinosus* - Brown Irish Lord.

A total of 196 brown Irish Lord was taken. This fish may be more common at mid-depth ranges as it was the most common fish at the two 40-50 ft. stations. At the 30-40 ft. station its numbers were about one-half

that of *A. harringtoni*. This species also occurs occasionally in the intertidal. Its congener, *H. hemilepidotus*, has not been taken during our work, perhaps indicating a preference for a habitat type that has not as yet been sampled.

3. *Liparis fucensis* - Slipskin snailfish.

Of four snailfishes collected, *L. fucensis* was by far the most common subtidally. The other three species; *L. florae*, *L. mucosus*, and *L. rutteri* occurred in low numbers; however *L. mucosus* was taken at all three stations. The greatest collection of *L. fucensis* occurred at a site where a sandy substrate existed.

4. *Chirolophus nugator* - Mosshead warbonnet.

This stichaeid has not been taken intertidally and is uncommonly observed by divers. As with *L. fucensis* the greatest numbers collected occurred at the station containing sand substrate. However its distinctive coloration would suggest that it would occupy algae covered or invertebrate encrusted substrate.

5. *Artedius fenestralis* - Padded sculpin.

Along with *A. harringtoni*, this species is one of the small cottids commonly observed by divers and categorized as "*Artedius*-type." Although taken in relatively small numbers, it occurred at all stations. This cottid probably has a rather ubiquitous subtidal distribution. Interestingly, its closest congener, *Artedius notospilotus* (Bonyhead sculpin), has not been collected although it would be expected from our survey area.

6. *Anoplarchus purpurescens* - High cockscomb.

This fish is a common element of the intertidal and its occurrence in relatively large numbers at the 40-50 ft. station is of interest. These subtidal *Anoplarchus* will be compared with the intertidal form for morphological differences.

Diver-Observed Fishes

Over 34 species of fishes were observed by divers during subtidal transect and reconnaissance dives (Table 23). Only eight of these might be regarded as commonly observed by divers and should be considered as "macro-fishes." The families concerned are; Cottidae, Embiotocidae, Hexagrammidae, and Scorpaenidae, each to be discussed below. Our observations are from depths ranging primarily from 15 to 60 feet.

Cottidae:

A large number of small cottids were encountered during dives, the majority were identified only as undetermined cottid or *Artedius*-type. It is impossible to positively identify to species many small forms unless they are collected and examined microscopically. Of the distinctive forms encountered, *Jordania zonope*, the longfin sculpin, was noted several times; *Synchirus gilli*, the manacled sculpin was observed on *Nereocystis* stipes on several occasions; and *Enophrys bison*, the buffalo sculpin, although very cryptic was noted several times, usually exposed and depending upon its shape and coloration for protection.

Cabezon were commonly observed and should be considered as one of the more important "macro-fishes." Cabezon were not seen in large numbers but were omnipresent. Only adults were observed, with some individuals estimated to weigh over ten pounds.

Embiotocidae:

Five species of surfperches were observed but only the striped surfperch, *Embiotoca lateralis*, was noted consistently. Surfperches were primarily seen in kelp beds.

Hexagrammidae:

Four hexagrammids were noted: lingcod, *Ophiodon elongatus;* kelp greenling, *Hexagrammos decagrammus;* rock greenling, *Hexagrammos superciliosus;* and

painted greenling, *Oxylebius pictus*. With the exception of the painted greenling, the other three species are of great importance and commonly encountered. The lingcod and kelp greenling were often in pairs and threes; the rock greenling almost always solitary.

Scorpaenidae:

Eleven species of rockfishes were observed. Of this number, three were common; blue rockfish, *Sebastes mystinus;* black rockfish, *Sebastes melanops;* and yellowtail-olive group, *Sebastes flavidus-serranoides* complex. Blue and black rockfishes were often noted in large numbers, with both juveniles and adults occurring. Juveniles were often associated with the bottom while the adults took positions throughout the water column. It was impossible to distinguish between the yellowtail and olive rockfishes as most of those encountered were juveniles. *Sebastes carnatus, S. chrysomelas, S. nebulosus, S. maliger,* and *S. rastrelliger* are bottom-dwelling, solitary forms and were noted only on occasion. *Sebastes miniatus* and *S. pinniger,* referred to as "Red rockfishes" by anglers, were seen several times. Although these are "bottom-type" fishes, we have always noted them as occurring from one to perhaps ten feet off the substrate.

SPORTFISHERY STUDIES

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 the Point Arena Power Plant may effect any one, or all of these fisheries.

The objectives of the sportfishery studies was to measure any effect on the fisheries as indicated by changes in catch rates, species composition, and size and age composition. During the past year 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 beginning in March 1972. Sampling days for abalone fishermen were selected from days when the tide level fell below 0.0 feet 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 as all 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 not accessible to our subtidal or intertidal sampling, roughly from -0.2 to 20.0 feet in depth. 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. Because of a lack of manpower and fishing effort, we discontinued regular sampling at the ranches after July. 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 we interviewed 499 shorepickers and 108 skindivers in the Central Area (Table 24). 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 respectively (Table 25). 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 shorepicker 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.

Unfortunately, in most cases, 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 2). The mean and modal lengths for abalone for the cove were 195.3 and 200 mm respectively. Mean and modal lengths for the abalone from the two ranches were 194.0 and 190 mm respectively. As might be expected, the lower tides produced large abalone; this can be seen by comparing the modal lengths for each oceanographic period.

During the Davidson Current Period of December 1971 through March 1972, the lowest time occurrence and sampling day was -0.6 feet on March 18 and 19, the modal length for this period was 190 mm (Figure 3). The lowest tide on a sampling day during the Upwelling Period was -2.0 feet on May 14, in fact, all of the tides on sampling days during this period fell below -1.0 feet; the principal modal abalone length during this period was 205 mm (Figure 4). During the Oceanic and early Davidson periods of the winter of 1972-73, maximum low tides on sampling days were -1.3 and -1.9 feet respectively; principal modal lengths were 185 mm and 205 mm respectively (Figure 5).

SKIFF FISHERY

A relatively small skiff fishery has operated out of Pt. 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 Pt. Arena south to Saunders Reef in depths ranging from about 50 to 150 feet.

We interviewed 129 fishermen from May through September; their catch consisted of 873 fish (Table 26). Lingcod, black rockfish and copper rockfish were the three most commonly caught of the 19 species identified. Catch-per-hour ranged from 0.88 fish in June to 2.54 fish in August.

Catch rates of party boat fishermen were not significantly higher than those of skiff fishermen. A total of 83 fishermen interviewed between June and October caught 764 fish for a catch-per-hour rate of 2.04 fish (Table 27). The three most abundant fishes in the party boat catches were black rockfish (39.9%), copper rockfish (11.0%), and lingcod (8.8%). Generally, the party boat fished west of Point Arena in depths of 75 to 150 feet 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. 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. Their catch consisted of 802 fish or an overall catch-per-hour of 2.07 fish as compared with the 1972 season's catch-per-hour of 1.71 fish (Table 28). 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. Black rockfish mean lengths increased from 441. to 473.1 mm tl, canary rockfish lengths decreased from 447.5 to 394.5 mm tl, china rockfish increased 370.3 to 402.2 mm tl, copper rockfish lengths decreased from 476.0 to 438 mm tl, and lingcod decreased from 753.7 to 653.9 mm tl (Table 29).

The changes in species composition, catch rates, and sizes probably represent both natural fluctuations, harvesting effects and differences in fishing techniques.

FOOD HABIT STUDIES

Studies of stomach contents were initiated on several of the more abundant fish to determine food webs and to assess the possibility of using some fish as biological samplers. Over 100 stomachs from eleven species of fish were collected from the skiff and party boat fishery and Chem Fish collections during the year; 66 (8 species) of these have undergone preliminary analysis.

Copper Rockfish

We have collected and examined 35 copper rockfish stomachs, six were empty (Table 30). The stomachs contained 17 different types of animals, the three most frequently observed were octopus, *Polypus hongongensis*, crabs, *Cancer oregensis*, and unidentified fish. It is interesting to note that we rarely have observed either the octopus or the crab in our subtidal surveys, as both are very cryptic; thus the copper rockfish may serve as biological samples for these particular animals.

Black Rockfish

Eleven stomachs have been examined, three were empty (Table 31). The stomachs contained at least 6 different types of animals. Salps, *Salpa* sp. were most frequently observed animals and made up most of the volume.

Cabezon

All seven of the cabezon stomachs examined contained food; 18 types of animals have been identified (Table 32). Canceroid crabs contributed the largest volume and were the most frequently observed.

The largest number of any one species observed was the octopus, *Polypus hongkongensis*

Grass Rockfish

This fish is one of the most important large predators found in the shallow waters (intertidal to 150 feet) in Point Arena Cove.

We have collected and examined only six stomachs thus far, one of which was empty (Table 33). Juvenile rockfish, *Sebastes* sp. contributed the highest volume, largest number of individuals, and were the most frequently observed food item.

A few stomachs have been collected and examined from china rockfish (4), olive rockfish (1), gopher rockfish (1) and quillback rockfish (1). Only one of the china rockfish stomachs contained food consisting of one *Petrolisthes eriomerus*, two *Cancer orgensis* and one unidentified crab. The olive rockfish stomach contained seven juvenile rockfish, *Sebastes* sp. and two sand lances, *Ammodytes hexapterus*. The gopher rockfish had been mainly feeding on crabs; two *Cancer orgensis*, one *Cancer* sp., one polychaete and one unidentified fish were found. One unidentified shrimp and seven nemotodes were found in the quillback rockfish stomach.

PLANKTON

Planktonic samples have been taken by project personnel in two periods of oceanic conditions at Pt. Arena. Emphasis has been placed on examination of samples for zooplankton collected during the different oceanic periods.

Six samples were taken on July 20 and 21, 1972. Four of these were from the central subtidal region and two were from the northern subtidal region. These samples were taken with a quarter-meter mouth diameter net with a phytoplankton mesh. While divers were down at a subtidal station the plankton net was lowered to the bottom and hauled up to the surface at a steady rate. This short vertical haul was repeated three times in order to concentrate material. The collected material was washed into containers and later formalin was added.

On October 26, 1972 another method and a new net were used to collect a plankton sample. The collection was made near the Pt. Arena whistle buoy which is located just outside Arena Cove. The new net has a mouth diameter of one-third meter and has a larger mesh than the net which was previously utilized. The net was lowered to a depth of approximately 40 feet, towed behind the moving boat and raised to the surface gradually over a period of approximately ten minutes. The collected material was, as before, washed down into a container and formalin was later added.

In the July samples a preponderance of phytoplankton was found. The four central region samples were taken from stations at a mean depth of 51 feet. The two northern area samples were taken from an average depth of 22 feet. None of the samples showed a high concentration of zooplankton. There were no zooplankton observed in the two shallow station samples. The

zooplankton found in the deeper station samples consisted of a few adult and nauplius stage copepods. Nauplius stage individuals were found in a ratio of over 2:1 to the adult individuals. The lack of zooplankton in the shallow stations could be due to the smaller volume of water strained through the net.

The October towing sample had a much greater concentration of zooplankton. Very little phytoplankton was seen in this sample. The zooplankton seen were copepods, both adult and nauplius stage, and *Ceratium* sp., a dinoflagellate. These three types of zooplankton were seen in approximately equal ratios. The adult copepods collected in this sample were much larger than those found in the July sample.

During the upwelling period the planktonic bloom was clearly visible in the water, both from the surface and while descending to a subtidal station. Salps, at least two types of ctenophores and hydromedusae were common throughout the water column and were highly concentrated near the sea surface during the summer months. *Cancer magister* megalops were seen floating in rafts on the surface and individuals were collected offshore in the central area on June 9, 1972. Phytoplankton density was higher in the upwelling period than in the Davidson Current period probably due to the increased amounts of nutrients in the water. This greater density plus use of a phytoplankton mesh net meant that the contents of the July samples were mainly phytoplankton.

The October sample was taken during the oceanic period. This sample was taken with a larger net with a larger mesh; towing behind the boat for approximately ten minutes resulted in more water being strained through the mesh. These parameters of collection plus the different oceanic period and subsequent difference of nutrient density in the water would account for the differences between samples.

FUTURE REPORTS

Because of the change in status of the Mendocino Power Plant Site we concluded field studies at the site in April 1973. A final report of our studies covering the entire study period and including statistical analysis, discussions, conclusion and appropriate photography is now in preparation and will be completed by July 1, 1973.

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Scientific Name	Station # and Numbers of Organisms Observed:														
Algae:	35	93	118	146	191	199	246	251	264	274	312	A**	Sum	Freq.	Mean
Nereocystis luetkeana	0	0	0	3	0	0	Obs	Obs	30	0	0	0	33	(2)* 4	3.3
Laminaria setchellii	0	Obs	3	Obs	2	0	0	0	200	Obs	0	0	205	(3)* 6	22.8
Pterygophora californica	0	0	0	6	0	0	0	0	0	0	0	0	6	1	0.5
Cystoseira osmundacea	0	Obs	0	0	0	0	0	0	0	0	0	0	Obs	1	--
Desmarestia munda	0	0	0	Obs	0	0	0	0	0	Obs	0	0	Obs	2	--
Invertebrates:															
Strongylocentrotus franciscanus	89	0	361	327	197	49	158	17	260	147	20	27	1741	11	145.1
S. purpuratus	0	0	0	7	0	0	0	0	0	189	0	0	196	2	16.3
Pycnopodia helianthoides	Obs	0	11	11	7	0	0	5	6	3	1	2	46	(1)* 9	3.8
Dermasterias imbricata	Obs	0	0	0	6	0	0	3	0	1	0	2	12	(1)* 5	1.0
Pisaster brevispinus	Obs	0	5	0	3	0	0	2	6	0	8	5	29	(1)* 7	2.4
P. giganteus	0	0	2	0	0	0	0	1	0	1	0	1	5	4	0.4
P. ochraceus	0	4	0	0	0	0	0	0	0	8	0	0	12	2	1.0
Pisaster sp.	0	2	0	0	0	0	0	0	0	0	0	0	2	1	0.2
Solaster dawsoni	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.1
S. stimpsoni	0	0	0	0	1	0	0	0	Obs	0	0	2	3	(1)* 3	0.2
Solaster sp.	0	0	5	1	0	0	0	0	0	0	16	0	22	3	1.8
Henricia leviuscula	Obs	1	5	0	13	0	0	11	6	4	10	3	53	(1)* 9	4.4
Orthasterias koehleri	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0.1
Cucumaria miniata	0	0	0	0	0	0	0	1	0	0	0	1	2	2	0.2
Haliotis kamtschatkana	2	0	0	0	4	4	0	2	1	0	1	2	16	7	1.3
H. rufescens	0	115	2	9	0	0	3	0	21	2	0	0	152	6	12.7
H. wallalensis	0	1	0	1	0	0	0	0	0	2	0	0	4	3	0.3
Hinnites multirugosus	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0.1
Cryptochiton stelleri	0	9	6	0	0	0	0	0	5	5	0	0	25	4	2.1
Depths in feet:	47	22	32	15	47	65	40	71	37	30	72	72			

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.
** = Station A is located outside the boundary of the present Central Area.
Freq = Number of stations of occurrence.
Mean = Number of organisms divided by total stations sampled.
Obs = Observed but not counted.

TABLE 2. Numbers and Frequency of Occurrence of 5 Species of Brown Algae and 20 Species of Invertebrates - Central Area - Mendocino Power Plant Site - December 1971 through December 1972.

Scientific Name	Davidson Current December 1971 - March 1972			Upwelling Period May - July 1972			Oceanic Period September - October 1972		
Algae:	Sum	Freq. 4 Stations	Mean	Sum	Freq. 21 Stations	Mean	Sum	Freq. 2 Stations	Mean
Nereocystis luetkeana	0	0	0	94	6	4.5	174	2	87.2
Laminaria setchellii	6	2	1.5	685 (1)*	12	34.3	64	2	32.0
Pterygophora californica	1	1	0.2	93	7	4.4	38	1	19.0
Cystoseira osmundacea	15	1	3.7	3	3	0.1	0	0	0
Desmarestia munda	0	0	0	152 (3)*	8	8.4	110	1	55.0
Invertebrates:									
Strongylocentrotus franciscanus	197	3	49.2	997	16	47.5	286	2	143.0
S. purpuratus	0	0	0	101	3	4.8	0	0	0
Pycnopodia helianthoides	2	1	0.5	21	9	1.0	2	1	1.0
Dermasterias imbricata	6	2	1.5	19	11	0.9	0	0	0
Pisaster brevispinus	11	3	2.7	29	11	1.4	10	2	5.0
P. giganteus	0	0	0	3	3	0.1	1	1	0.5
P. ochraceus	0	0	0	18	9	0.9	0	0	0
Solaster dawsoni	1	1	0.2	2	2	0.1	2	2	1.0
S. stimpsoni	3	2	0.8	3	3	0.1	2	2	1.0
Henricia leviuscula	24	3	6.0	131	18	6.2	2	2	1.0
Orthasterias koehleri	3	2	0.8	7	7	0.3	1	1	0.5
Cucumaria miniata	0	0	0	41	10	2.0	0	0	0
Eupentacta quinquesemita	0	0	0	35	10	1.7	1	1	0.5
Stichopus californicus	0	0	0	1	1	0.1	0	0	0
Loxorhynchus crispatus	0	0	0	7	5	0.3	0	0	0
Haliotis kamtschatkana	4	3	1.0	24	8	1.1	1	1	0.5
H. rufescens	13	1	3.2	111	10	5.3	4	2	2.0
H. wallalensis	0	0	0	4	4	0.2	0	0	0
Hinnites multirugosus	0	0	0	1	1	0.1	0	0	0
Cryptochiton stelleri	4	2	1.0	44	12	2.1	1	1	0.5

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.

TABLE 3. Numbers and Frequency of Occurrence of 5 Species of Brown Algae and 20 Species of Invertebrates - North Control Area - Mendocino Power Plant Site - December 1971 through December 1972.

Scientific Name	Davidson Current December 1971 - March 1972			Upwelling Period May - July 1972			Oceanic Period September - October 1972		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
Algae:		4 Stations			20 Stations			0 Stations	
Nereocystis luetkeana	0	0	0	9	4	0.5			
Laminaria setchellii	216	2	54.0	449	15	22.5			
Pterygophora californica	0	0	0	186	9	9.3			
Cystoseira osmundacea	3	1	0.8	30	4	1.5			
Desmarestia munda	0	0	0	586 (1)*	13	30.8			
Invertebrates:									
Strongylocentrotus franciscanus	163	3	40.7	1119	19	56.0			
S. purpuratus	3	2	0.8	302	7	15.1			
Pycnopodia helianthoides	1	1	0.2	20	9	1.0			
Dermasterias imbricata	4	2	1.0	13	9	0.7			
Pisaster brevispinus	1	1	0.2	10	7	0.5			
P. giganteus	1	1	0.2	5	3	0.3			
P. ochraceus	1	1	0.2	4	3	0.2			
Solaster dawsoni	3	2	0.8	1	1	0.1			
S. stimpsoni	0	0	0	5	4	0.2			
Henricia leviuscula	18	3	4.5	125	18	6.2			
Orthasterias koehleri	1	1	0.2	8	4	0.4			
Cucumaria miniata	0	0	0	21	11	1.1			
Eupentacta quinquesemita	0	0	0	222 (1)*	11	11.7			
Stichopus californicus	0	0	0	1	1	0.1			
Loxorhynchus crispatus	2	1	0.5	14	8	0.7			
Haliotis kamtschatkana	6	2	1.5	26	7	1.3			
H. rufescens	25	2	6.3	107	12	5.3			
H. wallalensis	1	1	0.2	4	3	0.2			
Hinnites multirugosus	1	1	0.2	12	6	0.6			
Cryptochiton stelleri	16	3	4.0	97	14	4.8			

NO STATISTICAL TESTS

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.

TABLE 4. Numbers and Frequency of Occurrence by Depth of 5 Species of Brown Algae and 20 Species of Invertebrates - Central Area - Mendocino Power Plant Site - December 1971 through December 1972.

Scientific Name	Depth Range 0 - 25' (7 Stations)			Depth Range 26 - 50' (12 Stations)			Depth Range 51 - 75' (8 Stations)		
Algae:	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
Nereocystis luetkeana	195	3	27.9	73	5	6.1	0	0	0
Laminaria setchellii	325 (1)*	7	54.2	427	8	35.6	3	1	0.4
Pterygophora californica	88	5	12.6	44	4	3.7	0	0	0
Cystoseira osmundacea	16	2	2.3	2	2	0.2	0	0	0
Desmarestia munda	177 (1)*	5	29.5	85 (2)*	4	8.5	0	0	0
Invertebrates:									
Strongylocentrotus franciscanus	436	5	62.3	814	8	67.8	230	8	28.7
S. purpuratus	94	2	13.4	7	1	0.6	0	0	0
Pycnopodia helianthoides	7	3	1.0	15	6	1.3	3	2	0.4
Dermasterias imbricata	1	1	0.1	16	7	1.3	8	5	1.0
Pisaster brevispinus	12	4	1.7	11	6	0.9	27	6	3.4
P. giganteus	1	1	0.1	2	2	0.2	1	1	0.1
P. ochraceus	2	2	0.3	11	4	0.9	5	3	0.6
Solaster dawsoni	1	1	0.1	2	2	0.2	2	2	0.3
S. stimpsoni	1	1	0.1	3	3	0.2	4	3	0.5
Henricia leviuscula	28	5	4.0	58	10	4.8	71	8	8.9
Orthasterias koehleri	0	0	0	5	5	0.4	6	5	0.7
Cucumaria miniata	12	2	1.7	24	5	2.0	5	3	0.6
Eupentacta quinquesemita	11	4	1.6	21	5	1.8	4	2	0.5
Stichopus californicus	0	0	0	1	1	0.1	0	0	0
Loxorhynchus crispatus	1	1	0.1	4	3	0.3	2	1	0.3
Haliotis kamtschatkana	0	0	0	16	6	1.3	13	6	1.6
H. rufescens	55	6	7.9	73	7	6.1	0	0	0
H. wallalensis	2	2	0.3	2	2	0.2	0	0	0
Hinnites multirugosus	0	0	0	1	1	0.1	0	0	0
Cryptochiton stelleri	38	6	5.4	17	6	1.4	4	3	0.5
Depths in feet:	7-15-19-20-22-24-24			27-29-29-30-32-32-35-35-35-42-43-50			52-54-57-57-59-62-65-65		

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.

TABLE 5. Numbers and Frequency of Occurrence of 5 Species of Brown Algae and 20 Species of Invertebrates - North Control Area - Mendocino Power Plant Site - December 1971 through December 1972.

Scientific Name	Depth Range 0 - 25' (9 Stations)			Depth Range 26 - 50' (11 Stations)			Depth Range 51 - 75' (4 Stations)		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
Algae:									
Nereocystis luetkeana	2	2	0.2	7	2	0.6	0	0	0
Laminaria setchellii	307	7	34.1	356	9	32.4	2	1	0.5
Pterygophora californica	184	7	20.4	2	2	0.2	0	0	0
Cystoseira osmundacea	22	2	2.4	11	3	1.0	0	0	0
Desmarestia munda	453	8	50.3	133	4	12.1	0	0	0
Invertebrates:									
Strongylocentrotus franciscanus	421	8	46.8	715	10	65.0	146	4	36.5
S. purpuratus	297	6	33.0	8	3	0.7	0	0	0
Pycnopodia helianthoides	15	6	1.7	6	4	0.6	0	0	0
Dermasterias imbricata	1	1	0.1	9	6	0.8	7	4	1.8
Pisaster brevispinus	2	1	0.2	5	4	0.4	4	3	1.0
P. giganteus	3	1	0.3	1	1	0.1	2	2	0.5
P. ochraceus	2	1	0.2	3	3	0.3	0	0	0
Solaster dawsoni	0	0	0	4	3	0.4	0	0	0
S. stimpsoni	1	1	0.1	3	2	0.3	1	1	0.2
Henricia leviuscula	31	7	3.4	71	10	6.5	41	4	10.3
Orthasterias koehleri	1	1	0.1	5	2	0.4	3	2	0.7
Cucumaria miniata	12	7	1.3	2	1	0.2	7	3	1.8
Eupentacta quinquesemita	117	4	13.0	90 (1)*	3	9.0	25	4	6.2
Stichopus californicus	0	0	0	0	0	0	1	1	0.3
Loxorhynchus crispatus	1	1	0.1	13	6	1.2	2	2	0.5
Haliotis kamtschatkana	1	1	0.1	17	5	1.6	14	3	3.5
H. rufescens	98	8	10.9	34	6	3.1	0	0	0
H. wallalensis	1	1	0.1	4	3	0.4	0	0	0
Hinnites multirugosus	2	1	0.2	6	4	0.5	5	2	1.2
Cryptochiton stelleri	60	8	6.7	41	8	3.7	12	1	3.0
Depths in feet:	14-19-20-20-20-22 23-25-25			26-27-30-35-37-37-40 40-40-45-49			51-55-60-65		

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.

TABLE 6. Numbers and Frequency of Occurrence by Depth of 5 Species of Brown Algae and 20 Species of Invertebrates - Areas Combined - Mendocino Power Plant Site - December 1971 through December 1972.

Scientific Name	Depth Range 0 - 25' 16 Stations			Depth Range 26 - 50' 23 Stations			Depth Range 51 - 75' 12 Stations			Totals 51 Stations		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
Algae:												
Nereocystis luetkeana	197	5	12.3	80	7	3.5	0	0	0	277	12	5.4
Laminaria setchellii	332	(1)* 14	22.1	783	17	34.0	5	2	0.4	1120	(1)* 33	22.4
Pterygophora californica	272	12	17.0	46	6	2.0	0	0	0	318	18	6.2
Cystoseira osmundacea	38	4	2.4	13	5	0.6	0	0	0	51	9	1.0
Desmarestia munda	630	(1)* 13	42.0	218	(2)* 8	9.5	0	0	0	848	(3)* 21	17.7
Invertebrates:												
Strongylocentrotus franciscanus	857	13	53.6	1529	18	66.5	376	12	31.3	2762	43	54.2
S. purpuratus	391	8	24.4	15	4	0.6	0	0	0	406	12	8.0
Pycnopodia helianthoides	22	9	1.4	21	10	0.9	3	2	0.2	46	21	0.9
Dermasterias imbricata	2	2	0.1	25	13	1.1	15	9	1.3	42	24	0.8
Pisaster brevispinus	14	5	0.9	16	10	0.7	31	9	2.6	61	24	1.2
P. giganteus	4	2	0.3	3	3	0.1	3	3	0.2	10	8	0.2
P. ochraceus	4	3	0.3	14	7	0.6	5	3	0.4	23	13	0.5
Solaster dawsoni	1	1	0.1	6	5	0.3	2	2	0.2	9	8	0.2
S. stimpsoni	2	2	0.1	6	5	0.3	5	4	0.4	13	11	0.2
Henricia leviuscula	59	12	3.7	129	20	5.6	112	12	9.3	300	34	5.9
Orthasterias koehleri	1	1	0.1	10	7	0.4	9	7	0.8	20	15	0.4
Cucumaria miniata	24	9	1.5	26	6	1.1	12	6	1.0	62	21	1.2
Eupentacta quinquesemita	128	8	8.0	111	(1)* 8	5.0	29	6	2.4	268	(1)* 22	5.4
Stichopus californicus	0	0	0	1	1	0.1	1	1	0.1	2	2	0.1
Loxorhynchus crispatus	2	2	0.1	17	9	0.7	4	3	0.3	23	14	0.4
Haliotis kamtschatkana	1	1	0.1	33	11	1.4	27	9	2.2	61	21	1.2
H. rufescens	153	14	9.6	107	13	4.6	0	0	0	260	27	5.1
H. wallalensis	3	3	0.2	6	5	0.3	0	0	0	9	8	0.2
Hinnites multirugosus	2	1	0.1	7	5	0.3	5	2	0.4	14	8	0.3
Cryptochiton stelleri	98	14	6.1	58	14	2.5	16	4	1.3	172	32	3.4

* = Number of stations where organism observed qualitatively; stations not included in calculating mean.

TABLE 7. Numbers and Frequency of Occurrence of 5 Species of Brown Algae and 20 Species of Invertebrates - Reconnaissance Dives Within Arena Cove-Oceanic Period, October 26 - 28, 1972.

Scientific Name:	Station 1	2	3	4	5	6	8*	Sum	Freq.	Mean
Algae:										
Nereocystis luctkeana	1	55	47	2	0	0	0	105	4	15.0
Laminaria setchellii	5	127	87	1	8	7	0	235	6	33.6
Pterygophora californica	2	330	37	0	20	12	0	401	5	57.3
Cystoseira osmundacea	0	0	0	0	0	0	0	0	0	0
Desmarestia munda	1	68	0	0	0	0	0	69	2	9.9
Invertebrates:										
Strongylocentrotus franciscanus	55	183	79	41	236	0	77	671	6	95.9
S. purpuratus	0	0	0	0	0	0	0	0	0	0
Pycnopodia helianthoides	2	0	3	6	0	1	1	13	5	1.9
Dermasterias imbricata	0	0	3	0	0	0	0	3	1	0.4
Pisaster brevispinus	6	4	5	30	8	6	0	59	6	8.4
P. giganteus	0	1	0	0	1	0	0	2	2	0.3
P. ochraceus	0	0	0	0	0	0	0	0	0	0
Solaster dawsoni	0	0	0	2	1	0	0	3	2	0.4
S. stimpsoni	2	0	1	0	0	1	0	4	3	0.6
Henricia leviuscula	9	8	3	7	8	7	2	44	7	6.3
Orthasterias koehleri	0	1	0	0	0	0	0	1	1	0.1
Cucumaria miniata	0	0	0	0	0	0	0	0	0	0
Eupentacta quinquesemita	0	0	0	0	0	0	0	0	0	0
Stichopus californicus	0	0	0	0	0	0	0	0	0	0
Loxorhynchus crispatus	0	0	0	0	0	0	0	0	0	0
Haliotis kamtschatkana	5	0	0	2	1	0	2	10	4	1.4
H. rufescens	2	6	37	0	4	5	1	55	6	7.9
H. wallalensis	0	0	0	0	0	0	0	0	0	0
Hinnites multirugosus	0	0	0	3	0	0	0	3	1	0.4
Cryptochiton stelleri	2	2	1	0	0	1	0	6	4	0.9
Depth in feet:	44	37	25	55	45	40	30			

* = At Station 7 only qualitative data recorded.

TABLE 8. Abundance of Subtidal Red Algae in 1/4m^2 Quadrats - Central Area Mendocino Power Plant Site - Upwelling Period 1972.

Species	Dry weight (g)	Frequency	Mean (g)
Botryoglossum farlowianum	95.8	1	13.68
B. ruprechtiana	9.5	1	1.36
Callophyllis crenulata	4.5	2	0.64
C. flabellulata	0.3	2	0.04
Constantinea simplex	6.7	1	0.96
Hymenena flabelligera	7.8	1	1.11
Hymenena sp.	0.06	1	0.01
Odanthalia washingtoniensis	1.5	2	0.21
Opuntiella californica	4.2	2	0.60
Plocamium pacificum	6.5	1	0.93
Polyneura latissima	3.1	3	0.44
Pterosiphonia dendroidea	Trace	1	Trace
Ptilota sp.	6.3	1	0.90
Rhodymenia pacifica	4.8	1	0.68
Schizymenia pacifica	8.5	3	1.21
Stenogramma californica	0.3	1	0.04
Unidentified	3.0	3	0.43
TOTALS	162.9		23.26
TOTAL STATIONS		7	

TABLE 9. Abundance of Subtidal Red Algae in ¼m² Quadrats - North Control Area - Mendocino Power Plant Site - Upwelling Period 1972.

Species	Dry Weight (g)	Frequency	Mean (g)
Botryoglossum ruprechtiana	0.6	1	0.06
Botryoglossum sp.	2.4	2	0.24
Callophyllis crenulata	0.9	1	0.09
C. firma	0.6	1	0.06
C. flabellulata	8.5	5	0.85
C. sp.	3.4	3	0.34
Constantinea simplex	42.6	4	4.36
Fryeella gardneri	1.8	3	0.18
Halymenia coccinea	0.2	1	0.02
Hedophyllum sp.	0.6	1	0.06
Herposiphonia rigida	1.7	1	0.17
Hymenena flabelligera	0.6	1	0.06
H. multiloba	0.5	1	0.05
Iridaea sp.	6.1	1	0.61
Nienburgia andersoni	3.1	1	0.31
Opuntiella californica	17.5	3	1.75
Pikea californica	0.8	1	0.08
Polyneura latissima	7.2	2	0.72
Pugetia fragilissima	4.6	3	0.46
Rhodymenia pacifica	15.0	1	1.50
Schizymenia pacifica	3.3	1	0.33
TOTALS	122.0		12.2
TOTAL STATIONS		10	

TABLE 10. Abundance of Subtidal Red Algae in 1/4m^2 Quadrats by 25 Foot Depth Intervals - Mendocino Power Plant Site - Upwelling Period 1972.

Species	Depth (in feet) 0 - 25			26 - 50			51 - 75		
	Dry wt.(g)	Freq.	Mean (g)	Dry wt.(g)	Freq.	Mean (g)	Dry wt.(g)	Freq.	Mean (g)
Botryoglossum farlowianum	95.8	1	15.97	0	0	0	0	0	0
B. ruprechtiana	0.6	1	0.10	9.5	1	0.95	0	0	0
B. sp.	0.4	1	0.07	2.0	1	0.20	0	0	0
Callophyllis crenulata	3.5	1	0.58	1.9	2	0.19	0	0	0
C. firma	0	0	0	0.6	1	0.06	0	0	0
C. flabellulata	0	0	0	8.5	6	0.85	0.3	1	0.3
C. sp.	2.2	2	0.37	1.2	1	0.12	0	0	0
Constantinea simplex	38.0	3	6.33	11.3	2	1.13	0	0	0
Fryeela gardneri	0	0	0	1.6	2	0.16	0.2	1	0.2
Halymenia coccinea	0	0	0	0.2	1	0.02	0	0	0
Hedophyllum sp.	0.6	1	0.10	0	0	0	0	0	0
Herposiphonia rigida	0	0	0	1.7	1	0.17	0	0	0
Hymenena flabelligera	0	0	0	1.7	1	0.17	0	0	0
H. multiloba	0	0	0	0.5	1	0.05	0	0	0
H. sp.	0	0	0	0.1	1	0.01	0	0	0
Iridea sp.	6.1	1	1.02	0	0	0	0	0	0
Nienburgia Andersoniana	3.1	1	0.52	0	0	0	0	0	0
Odonthalia washingtoniensis	1.0	1	0.17	0.5	1	0.05	0	0	0
Opuntiella californica	0	0	0	21.7	5	2.17	0	0	0
Pikea californica	0.8	1	0.13	0	0	0	0	0	0
Plocamium pacificum	6.5	1	1.08	0	0	0	0	0	0
Polyneura latissima	0	0	0	9.7	4	0.97	0.6	1	0.6
Pterosiphonia dendroidea	Trace	1	Trace	0	0	0	0	0	0
Ptilota sp.	6.3	1	1.05	0	0	0	0	0	0
Pugetia fragilissima	0	0	0	2.9	2	0.29	1.7	1	1.7
Rhodymenia pacifica	4.8	1	0.80	15.0	1	1.50	0	0	0
Schizymenia pacifica	6.7	2	1.12	5.1	2	0.51	0	0	0
Stenogramma californica	0	0	0	0.3	1	0.03	0	0	0
Unidentified	2.0	1	0.33	0.1	2	0.01	0	0	0
TOTALS	178.4		29.73	102.8		11.25	2.8		2.80
NUMBER OF STATIONS		6			10			1	

TABLE 11. Abundance of Intertidal Invertebrates, ¼ m^2 Quadrats by Oceanographic Periods - Central Area - Mendocino Power Plant Site - November 1971 through December 1972.

SPECIES	Oceanic			Davidson			Upwelling			Totals		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
COELENTERATA												
Anthopleura elegantissima	93	8	3.00	99	14	2.30	60	4	1.15	252	26	2.00
A. xanthogrammica	2	2	0.06	10	4	0.23	2	2	0.04	14	8	0.11
Ballanophyllia elegans	7	3	0.22	1	1	0.02	5	2	0.10	13	6	0.10
Epiactis prolifera	10	3	0.32	82	13	1.91	80	13	1.54	172	29	1.36
Tealia sp.	0	0	0.00	20	2	0.46	0	0	0.00	20	2	0.16
ARTHROPODA												
Balanus cariosus	11	4	0.35	0	0	0.00	0	0	0.00	11	4	0.09
Cancer antennarius	1	1	0.03	0	0	0.00	0	0	0.00	1	1	0.01
Cancer oregonensis	0	0	0.00	2	2	0.05	0	0	0.00	2	2	0.02
Cancer sp.	5	3	0.16	1	1	0.02	4	4	0.08	10	8	0.08
Haplogaster cavicauda	0	0	0.00	1	1	0.02	1	1	0.02	2	2	0.02
Loxorhynchus crispatus	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
Mimulus foliatus	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
Pollicipes polymerus	0	0	0.00	0	0	0.00	1	1	0.02	1	1	0.01
Pugettia producta	15	7	0.48	36	12	0.84	18	9	0.35	69	28	0.55
MOLLUSCA												
Acmaea sp.*	78	17	2.52	77	22	1.79	79	30	1.52	234	69	1.86
Archidoris montereyensis	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
Calliostoma spp.	13	6	0.42	14	4	0.32	4	3	0.08	31	14	0.25
Cryptochiton stelleri	2	2	0.06	3	3	0.07	5	5	0.10	10	10	0.08
Fusinus sp.	0	0	0.00	0	0	0.00	2	2	0.04	2	2	0.02
Haliotis cracherodii	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
H. rufescens	0	0	0.00	1	1	0.02	1	1	0.02	2	2	0.02
Hermissenda crassicornis	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
Katharina tunicata	27	13	0.87	18	8	0.42	36	10	0.69	81	31	0.64
Mopalia spp.	63	9	2.03	13	11	0.30	22	7	0.42	98	27	0.78
Mytilus californianus	101	9	3.26	5	4	0.12	31	10	0.60	137	23	1.09
Rostanga pulchra	0	0	0.00	2	2	0.05	0	0	0.00	2	2	0.02
Tegula brunnea	46	6	1.48	95	25	2.21	177	32	3.40	318	63	2.52
T. funebralis	166	13	5.35	44	7	1.02	128	4	2.46	338	24	2.68
Tonicella lineata	28	13	0.90	47	16	1.09	27	14	0.48	102	43	0.81
ECHINODERMATA												
Henricia leviuscula	0	0	0.00	1	1	0.02	1	1	0.02	2	2	0.02
Leptasterias sp.	11	5	0.35	24	15	0.56	14	12	0.27	49	32	0.39
Pisaster ochraceous	0	0	0.00	6	4	0.14	0	0	0.00	6	4	0.05
Pycnopodia helianthoides	0	0	0.00	1	1	0.02	0	0	0.00	1	1	0.01
Strongylocentrotus purpuratus	500	22	16.1	701	35	16.3	1183	42	22.8	2384	99	18.9
TOTAL ANIMALS	1179		38.0	1309		30.4	1881		36.2	4369		34.7
TOTAL SPECIES	19			30			22			34		
TOTAL 1/4 m Quadrats		31			43			52			126	

* Adult counts only, juveniles were ubiquitous.
Frequency includes stations where juveniles only were observed.

TABLE 12. Abundance of Intertidal Invertebrates, ¼ m^2 Quadrats by Oceanographic Periods - North Control Area - Mendocino Power Plant Site - November 1971 through December 1972.

SPECIES	Oceanic			Davidson			Upwelling			Totals		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
COELENTERATA												
Anthopleura elegantissima	197	10	7.04	136	9	5.67	71	6	1.97	404	25	4.59
A. xanthogrammica	7	4	0.25	1	1	0.04	12	6	0.33	20	11	0.23
Epiactis prolifera	13	2	0.46	71	9	2.96	61	12	1.69	145	23	1.65
Tealia sp.	0	0	0.00	3	1	0.04	0	0	0.00	3	1	0.03
ARTHROPODA												
Balanus cariosus	9	3	0.32	113	3	4.71	0	0	0.00	122	6	1.39
Cancer sp.	1	1	0.04	0	0	0.00	1	1	0.03	2	2	0.02
Loxorhynchus crispatus	0	0	0.00	1	1	0.04	0	0	0.00	1	1	0.01
Pollicipes polymerus	7	1	0.25	1	1	0.04	17	1	0.47	25	3	0.28
Pugettia producta	3	3	0.11	1	1	0.04	12	9	0.33	16	13	0.18
MOLLUSCA												
Acmaea spp*	196	19	7.00	69	18	2.88	189	28	5.25	454	65	5.16
Calliostoma spp.	1	1	0.04	7	4	0.29	6	4	0.17	14	9	0.16
Cryptochiton stelleri	0	0	0.00	1	1	0.04	3	3	0.08	4	4	0.04
Haliotis rufescens	0	0	0.00	0	0	0.00	1	1	0.03	1	1	0.01
Katharina tunicata	20	9	0.71	19	6	0.79	14	8	0.39	53	23	0.60
Mopalia spp.	76	12	2.71	58	8	2.42	33	10	0.92	167	30	1.90
Mytilus californianus	120	8	4.28	14	3	0.58	180	10	5.00	314	21	3.57
Rostanga pulchra	0	0	0.00	2	2	0.08	0	0	0.00	2	2	0.02
Tegula brunnea	66	9	2.36	167	14	6.96	201	22	5.58	434	45	4.93
T. funebralis	2	1	0.07	113	7	4.71	2	1	0.06	117	9	1.33
Thais sp.	19	3	0.68	0	0	0.00	0	0	0.00	19	3	0.22
Tonicella lineata	12	6	0.43	16	6	0.67	14	8	0.39	42	20	0.48
ECHINODERMATA												
Henricia leviuscula	0	0	0.00	1	1	0.04	0	0	0.00	1	1	0.01
Leptasterias sp.	20	8	0.71	10	4	0.42	9	7	0.25	39	19	0.44
Pisaster ochraceous	0	0	0.00	1	1	0.04	1	1	0.03	2	2	0.02
Pycnopodia helianthoides	0	0	0.00	0	0	0.00	1	1	0.03	1	1	0.01
Strongylocentrotus purpuratus	307	22	10.96	477	19	19.88	661	34	18.36	1445	75	16.42
TOTAL ANIMALS	1076		38.43	1282		53.42	1489		41.36	3847		43.72
TOTAL SPECIES	18			22			20			26		
TOTAL 1/4 m Quadrats		28			24			36			88	

* Adult counts only, juveniles were ubiquitous.

TABLE 13. Abundance of Intertidal Invertebrates, from ¼ m² Quadrats by Stratified Zone - Central Area - Mendocino Power Plant Site - November 1971 through December 1972.

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
COELENTERATA									
Anthopleura elegantissima				209	26	3.07	52	16	1.02
A. xanthogrammica				10	9	0.15	3	4	0.06
Ballanophyllia elegans				7	4	0.10	6	6	0.12
Epiactis prolifera				81	19	1.19	92	31	1.80
Tealia sp.							20	4	0.39
ARTHROPODA									
Balanus cariosus				11	6	0.16			
Cancer sp.				6	7	0.09	7	10	0.14
Haplogaster cavicauda				1	1	0.01	1	2	0.02
Loxorhynchus crispatus				1	1	0.01			
Mimulus foliatus							1	2	0.02
Pollicipes polymerus							1	2	0.02
Pugettia producta				45	26	0.66	24	22	0.47
MOLLUSCA									
Acmaea spp.	26	100	3.71	124	56	1.82	98	47	1.92
Archidoris montereyensis							1	2	0.02
Calliostoma spp.				24	15	0.35	4	6	0.08
Cryptochiton stelleri				7	10	0.10	3	6	0.06
Fusinus sp. †							2	4	0.04
Haliotis rufescens							2	4	0.04
Hermissenda crassicornis							1	2	0.02
Katharina tunicata	19	100	2.72	62	37	0.91			
Mopalia spp.	15	43	2.14	23	26	0.34	2	6	0.04
Mytilus californianus	106	100	15.14	27	19	0.40	4	4	0.08
Nuttallina californica	58	57	8.28	2	1	0.03			
Rostanga pulchra							2	4	0.04
Tegula brunnea				149	44	2.19	169	63	3.31
T. funebralis				176	21	2.58	162	20	3.18
Tonicella lineata	5	57	0.71	49	34	0.72	47	31	0.92
ECHINODERMATA									
Henricia leviuscula				1	1	0.01	1	2	0.02
Leptasterias spp.	9	57	1.29	33	31	0.48	7	14	0.14
Pisaster ochraceous				5	4	0.07	1	2	0.02
Pycnopodia helianthoides							1	2	0.02
Strongylocentrotus purpuratus	107	100	15.28	1261	72	18.55	1010	86	19.80
MEAN TOTAL NUMBER ANIMALS			49.29			34.03			33.80
TOTAL NUMBER QUADRATS		7			68			51	

*Percent Freq. = Percent of total quadrats animal occurred, rounded to nearest whole number.

† = Tentative identification.

TABLE 14. Abundance of Intertidal Invertebrates, from ¼ m^2 Quadrats by Stratified Zone - North Control Area - Mendocino Power Plant Site - November 1971 through December 1972.

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
COELENTERATA									
Anthopleura elegantissima	7	24	0.33	290	41	10.73	106	27	2.65
A. xanthogrammica	3	10	0.14	17	33	0.63	0		0
Epiactis prolifera	3	10	0.14	31	19	1.15	141	50	3.52
Tealia sp.	0		0	0		0	3	3	0.08
ARTHROPODA									
Balanus cariosus	113	14	5.40	9	11	0.33	0		0
Cancer sp.	0		0	1	4	0.04	1	3	0.03
Loxorhynchus crispatus	0		0	0		0	1	3	0.03
Pollicipes polymerus	25	14	1.19	0		0	0		0
Pugettia producta	0		0	6	19	0.22	10	20	0.25
MOLLUSCA									
Acmaea spp.	266	95	12.65	70	59	2.59	109	72	2.73
Calliostoma spp.	0		0	2	7	0.07	12	18	0.30
Cryptochiton stelleri	0		0	0		0	4	10	0.10
Haliotis rufescens	0		0	0		0	1	3	0.03
Katharina tunicata	19	38	0.90	25	41	0.93	9	10	0.22
Mopalia spp.	157†	86	7.48	14	30	0.52	4	10	0.10
Mytilus californianus	304	71	14.48	10	22	0.37	0		0
Rostanga pulchra	0		0	0		0	2	5	0.05
Tegula brunnea	0		0	86	37	3.19	358	88	8.95
T. funebralis	2	5	0.10	96	19	3.56	19	8	0.48
Thais emarginata	14	10	0.67	5	4	0.19	0		0
Tonicella lineata	5	19	0.24	6	19	0.22	31	27	0.78
ECHINODERMATA									
Henricia leviuscula	0		0	0		0	1	3	0.03
Leptasterias spp.	25	52	1.19	9	19	0.33	5	8	0.12
Pisaster ochraceous	0		0	1	4	0.04	1	3	0.03
Pycnopodia helianthoides	0		0	0		0	1	3	0.03
Strongylocentrotus purpuratus	144	76	6.85	537	85	19.88	764	92	19.10
MEAN TOTAL ANIMALS			51.76			44.99			39.55
TOTAL NUMBER QUADRATS		21			27			40	

* Percent Freq. = Percent of quadrats animal occurred, rounded to nearest whole number

† = Includes unknown numbers of *Nuttallina californica* which were misidentified as *Mopalia* spp. in the beginning.

TABLE 15. Average Dry Weight and Percent Frequency of Occurrence of Algal Species Found in Zone A - Mendocino Power Plant Site - November 1971 through December 1972.

Species	Central Area		North Control Area	
	Mean dry wt. (g)	Percent Freq.	Mean dry wt. (g)	Percent Freq.
Reds:				
Cryptopleura lobulifera	0.4	33	1.3	23
Endocladia muricata			37.7	62
Gigartina cristata			0.2	38
Halosaccion glandiforme	<0.1	17	1.8	62
Hymenena multiloba			0.2	8
Iridaea sp.			0.7	46
Microcladia borealis			<0.1	8
Odanthalia floccosa	36.0	33	14.4	62
Plocamium pacificum	Trace	17	<0.1	8
P. violaceum			1.5	31
Porphyra sp.			<0.1	8
Rhodoglossum affine			<0.1	15
Greens:				
Cladophora hemisphaerica			3.0	31
Ulva sp.			<0.1	8
Browns:				
Colpomenia sinuosa			<0.1	8
Heterochordaria abietina	0.1	33	0.4	31
TOTALS	36.5		61.2	
NUMBER OF STATIONS:		6		13

TABLE 16. Average Dry Weight and Percent Frequency of Occurrence of Algal Species Found in Zone B - Mendocino Power Plant Site - October 1971 through December 1972.

Species	Central Area Mean dry wt. (g)	Central Area Percent Freq.	North Control Area Mean dry wt. (g)	North Control Area Percent Freq.
Reds:				
Botryoglossum farlowianum	<0.1	2		
Constantinea simplex			0.2	8
Cryptopleura lobuliferum	4.1	39	7.0	49
Dilsea californica			<0.1	4
Endocladia muricata	6.7	12	3.2	15
Farlowia mollis	<0.1	2		
Gastroclonium Coulteri	2.5	12		
Gelidium Coulteri	0.3	4		
Gigartina Agardhii	<0.1	2		
G. californica	0.2	12		
G. canaliculata	1.4	12		
G. cristata	0.3	11	0.2	8
G. papillata	0.3	14		
Gloiosiphonia californica	0.3	5		
Halosaccion glandiforme	2.5	27	2.1	23
Hymenena flabelligera	0.3	5	0.8	4
H. multiloba	0.8	14		
Iridaea flaccidum	2.8	55	0.8	27
I. heterocarpum	0.7	7		
I. splendens	3.5	16	0.1	8
I. sp.			<0.1	4
Laurencia spectabilis	<0.1	7		
Microcladia borealis	1.7	39	1.8	39
M. Coulteri	<0.1	2		
Odanthalia floccosa	20.4	57	46.5	71
Plocamium violaceum	0.1	9	<0.1	4
Polysiphonia Henryi			0.4	8
Polysiphonia sp.	<0.1	4	0.1	4
Prionitis linearis			0.1	4
Rhodomela Larix	3.5	12	8.6	19
Schizymenia pacifica	0.3	5		
Greens:				
Codium fragile	2.2	7		
Spongomorpha coalita	<0.1	2		
Ulva lobata	0.3	11	<0.1	8
Browns:				
Colpomenia sinuosa			<0.1	8
Heterochordaria abietina	<0.1	4	0.3	15
TOTALS	55.2		72.1	

TABLE 17. Average Dry Weight and Percent Frequency of Occurrence of Algal Species Found in Zone C - Mendocino Power Plant Site - October 1971 through December 1972.

Species	Central Area Mean dry wt. (g)	Central Area Percent Freq.	North Control Area Mean dry wt. (g)	North Control Area Percent Freq.
Reds:				
Botryoglossum farlowianum	<0.1	6	0.9	24
Cryptopleura lobuliferum	1.0	31	0.2	14
Gastroclonium Coulteri	<0.1	3	0.1	5
Gigartina californica	0.4	6		
G. papillata	<0.1	6		
Halosaccion glandiforme	<0.1	14		
Hymenena flabelligera	0.7	6	0.7	14
H. multiloba			0.1	5
H. sp.	0.2	9	0.3	24
Iridaea flaccidum	4.5	37	8.4	33
I. splendens	<0.1	9		
I. sp.	0.7	9		
Laurencia spectabilis	0.7	37	1.6	33
Microcladia borealis	1.5	29	0.3	14
M. Coulteri	0.2	9		
Odonthalia floccosa	4.5	31	5.5	10
Opuntiella californica			0.1	5
Plocamium violaceum	<0.1	3	0.1	5
Polysiphonia californica	<0.1	9	1.2	5
P. Henryi	1.1	6	2.7	29
P. pacifica	<0.1	3		
P. sp.	0.7	14		
Prionitis lanceolata	<0.1	3		
Pterochondria Woodii	<0.1	3		
Pterosiphonia dendroidea	0.2	6	1.0	19
Ptilota hypnoides	<0.1	3	<0.1	5
Rhodomela Larix	2.3	14		
Schizymenia pacifica	0.3	9	2.8	5
Greens:				
Codium fragile	2.4	9		
Spongomorpha coalita	2.5	3		
Ulva lobata			1.3	24
Ulva sp.	1.0	9	<0.1	5
Browns:				
Colpomenia sinuosa	<0.1	3	<0.1	5
TOTALS	22.7		27.4	
NUMBER OF STATIONS		35		21

TABLE 18. Abundance of Intertidal Brown Algae, ¼ m^2 Quadrats, by Oceanographic Period - Mendocino Power Plant Site - November 1971 through December 1972.

	Oceanic Period			Central Area Davidson Period			Upwelling Period		
	Sum	Freq.	Mean	Sum	Freq.	Mean	Sum	Freq.	Mean
Laminaria setchelli	-	-	-	8	2	0.19	1	1	0.02
Costaria costata	3	1	0.10	-	-	-	32	7	0.62
Dictyoneurum californicum	4	1	0.13	14	1	0.33	141	3	2.71
Cystoseira osmundacea	1	1	0.03	9	3	0.21	13	4	0.25
Egregia menziesii	-	-	-	3	3	0.07	2	2	0.04
Alaria marginata	23	7	0.74	2	2	0.05	152	12	2.92
Postelsia palmaeformis	52	4	1.68	-	-	-	54	2	1.04
TOTAL QUADRATS		31			43			52	
				North Control Area					
Desmarestia herbaceae	-	-	-	-	-	-	1	1	0.03
Dictyoneurum californicum	-	-	-	30	1	1.25	19	2	0.53
Costaria costata	-	-	-	1	1	0.04	7	5	0.19
Laminaria setchelli	-	-	-	1	1	0.04	12	2	0.33
Alaria marginata	3	1	0.11	2	2	0.08	23	6	0.64
Postelsia palmaeformis	72	6	2.57	5	2	0.20	277	5	7.69
Fucus distichus	-	-	-	1	1	0.04	-	-	-
TOTAL QUADRATS		28			24			36	

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TABLE 20. Mean Percent Cover of Coralline Algae, ¼ m^2 Quadrats by Oceanographic Period and Intertidal Zone - Mendocino Power Plant Site - November 1971 through December 1972.

Articulated corallines	Zone -	Oceanic Period A	Oceanic Period B	Oceanic Period C	Davidson Period A	Davidson Period B	Davidson Period C	Upwelling Period A	Upwelling Period B	Upwelling Period C
					Central Area					
Mean percent cover		56	9	-	-	16	2	52	16	13
Frequency		4	8	-	-	20	1	3	16	14
Total number quadrats		4	27	0	0	33	10	3	23	26
Percent occurrence		100	29.5	-	-	60.5	10	100	69.5	53.8
					North Control Area					
Mean percent cover		10	5	0	20	-	5	17	19	15
Frequency		2	8	0	8	-	7	3	8	10
Total number quadrats		2	18	8	8	0	16	8	12	16
Percent occurrence		100	44.4	0	100	-	43.7	37.5	66.7	62.5

TABLE 21. Fishes Collected at 20 Intertidal Stations - Mendocino Power Plant Site - November 1971 through December 1972.

Species	Sum	Size range (mm SL)	Freq.	Range collection size *	Index of Abundance†	Rank**
Anoplarchus purpurescens	95	15.7 -124.0	12	1 - 38	1440	5
Apodichthys flavidus	60	24.7 -274.0	8	1 - 22	480	9
Artedius harringtoni	4	28.5 - 70.0	4	1	16	28
Artedius lateralis	47	26.0 -119.0	8	2 - 18	376	13
Ascelichthys rhodorus	28	55.0 -112.0	6	1 - 15	168	17
Cebidichthys violaceus	3	157.0 -360.0	2	1 - 2	6	32
Clinocottus acuticeps	2	25.5 - 37.4	1	2	2	35
Clinocottus analis	26	44.5 -127.0	4	1 - 16	104	20
Clinocottus embryum	7	31.5 - 58.0	4	1 - 3	28	23
Clinocottus globiceps	59	23.0 132.0	16	1 - 10	944	6
Clinocottus recalvus	13	54.0 - 96.0	1	13	13	30
C. globiceps-recalvus complex	93	13.1 - 40.5	4	1 - 67	372	14
Embiotoca lateralis	6	89.0 -149.0	1	6	6	32
Enophrys bison	1	52.6	1	1	1	38
Gibbonsia metzi	4	26.3 -178.0	3	1 - 2	12	31
Gibbonsia montereyensis	8	66.1 -105.2	3	1 - 6	24	24
Gobiesox maeandricus	36	18.5 - 99.0	8	1 - 17	288	15
Herilepidotus spinosus	25	36.0 - 97.0	6	1 - 9	150	18
Hexagrammos decagrammus	54	53.6 -284.0	10	1 - 22	540	8
Hexagrammos superciliosus	8	128.0 -223.0	5	1 - 3	40	22
Liparis florae	62	11.0 - 96.5	12	1 - 19	744	7
Liparis fucensis	1	53.3	1	1	1	38
Liparis rutteri	9	31.1 - 52.8	2	1 - 8	18	27
Oligocottus maculosus	486	15.5 - 77.0	11	1 - 254	5346	4
Oligocottus rimensis	5	32.7 - 47.5	4	1 - 2	20	25
Oligocottus rubellio	5	15.8 - 35.5	4	1 - 2	20	25
Oligocottus snyderi	495	12.9 - 74.7	18	1 - 139	8910	1
Phytichthys chirus	2	61.2 - 92.4	2	1	4	34
Scorpaenichthys marmoratus	47	34.0 -212.0	9	1 - 18	423	11
Scytalina cerdale	2	28.4 - 30.5	1	2	2	35
Sebastes melanops	53	58.0 - 98.6	9	1 - 35	477	10
Sebastes mystinus	30	44.2 - 75.0	4	1 - 25	120	19
Sebastes rastrelliger	1	236.0	1	1	1	38
Sebastes spp.	2	39.6 - 42.9	1	2	2	35
Xererpes fucorum	55	24.4 -160.9	7	3 - 18	385	12
Xiphister atropurpureus	551	30.4 -238.0	16	2 - 365	8816	2
Xiphister mucosus	437	33.7 -461.0	13	1 - 307	5681	3
Xiphister spp.	34	20.8 -113.0	3	1 - 24	102	21
Cottidae	41	12.0 - 22.5	7	1 - 23	287	16
Stichaeidae	5	15.6 - 25.0	3	1 - 2	15	29

* Range is the number of individuals from the smallest and largest collections. Zero is not considered for this statistic.

† Index of Abundance = Sum X Frequency.

** Rank is based upon the Index of Abundance.

TABLE 22. Fishes Collected at 3 Subtidal Stations - Mendocino Power Plant Site - 1972

Species	Sum	Frequency	Size range mm SL	Index*
AGONIDAE - α	1	1	26.5	1
AGONIDAE - β	1	1	38.1	1
Ammodytes hexapterus	6	1	89.8 - 99.4	6
Anoplarchus purpurescens	30	2	21.4 - 90.1	60
Artedius corallinus	3	2	23.3 - 59.4	6
Artedius corallinus-lateralis complex	3	1	17.8 - 19.6	3
Artedius fenestralis	25	3	18.7 - 51.9	75
Artedius harringtoni	212	3	13.1 - 63.8	636
Artedius lateralis	1	1	26.1	1
Ascelichthys rhodorus	13	2	20.2 - 78.2	26
Bothragonus swanii	13	2	20.8 - 49.9	26
Chirolophis nugator	65	3	28.9 - 97.1	195
Citharichthys stigmaeus	10	1	36.3 - 99.6	10
Coryphopterus nicholsii	1	1	26.1	1
COTTIDAE - γ	6	2	15.4 - 23.6	12
Enophrys bison	13	2	12.0 - 59.9	26
Hemilepidotus spinosus	196	3	23.0 -146.5	588
Hexagrammos decagrammus	7	3	75.0 -118.5	21
Jordania zonope	7	2	41.3 - 81.8	14
Liparis florae	4	1	36.8 - 96.8	4
Liparis fucensis	86	3	18.0 - 78.8	258
Liparis mucosus	6	3	14.4 - 51.5	18
Liparis rutteri	1	1	22.6	1
Liparis spp.	14	2	9.9 - 49.4	28
Nautichthys oculofasciatus	3	1	25.3 - 52.9	3
Otophidium taylori	3	1	86.7 - 95.6	3
Oxylebius pictus	2	1	48.0 - 57.0	2
Pallasina barbata aix	1	1	52.3	1
Pholis schultzi	10	2	34.1 - 47.1	20
Phytichthys chirus	2	1	34.9 - 82.6	2
Rhamphocottus richardsoni	4	2	20.5 - 23.2	8
Scorpaenichthys marmoratus	10	3	35.8 -224.0	30
Sebastes flavidus	15	2	48.6 - 61.0	30
Sebastes melanops	7	1	37.3 - 60.0	7
Sebastes mystinus	20	1	50.5 -114.8	20
Sebastes pinniger	2	1	40.1 - 48.1	2
Synchirus gilli	7	1	27.5 - 41.9	7

Index* = Sum x frequency

AGONIDAE α & β, COTTIDAE γ - These fishes may represent either species new to science or species new to the California ichthyofauna and are currently being analyzed.

Dates and Depths of Collections:

March 17 40 - 50 feet
August 15 30 - 40 feet
August 17 40 - 50 feet

TABLE 23. Diver Observed Fishes - Mendocino Power Plant Site - September 1971 through December 1972.

Species	Periods:	Presurvey	Central Area			North Control Area		
			Davidson	Upwelling	Oceanic	Davidson	Upwelling	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 pallasii				X				N
Coryphopterus nicholsii		X		X				O
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				D
Gibbonsia sp.		X		X			X	I
Gobiesox maeandricus							X	V
GOBIIDAE				X				E
Hexagrammos decagrammus		X	X	X	X	X	X	S
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 24. 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	3.1	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 25. Number and Catch-Per-Unit-of-Effort of Red Abalone Taken by Shorepickers and Skindivers - South Control Area - Mendocino Power Plant Site - 1972.

	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Shorepickers											
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	3.0	5.0	4.4	4.4	4.0	--	--	--	--	5.0	4.4
Abalone per Hour	1.6	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 26. Species Composition, and Catch-Per-Unit-of-Effort of Fish Landed by Skiff Fishermen - Mendocino Power Plant Site - May-Septebmer 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
Grass	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 27. Species Composition, 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

TABLE 28. 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 29. 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	119	297 - 529	473.1
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	402.2
Copper	164	351 - 560	476.0	82	283 - 553	438.2
Vermilion	71	426 - 620	544.7	13	486 - 606	539.9
Miscellaneous						
Lingcod	82	456 -1080	753.7	93	462 - 946	653.9
Cabezon	35	411 - 670	513.1	26	378 - 618	479.5
Kelp greenling	35	316 - 400	364.6	9	238 - 410	366.7

TABLE 30. 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
Polypus hongkongensis	10	14	48.5
ARTHROPODA			
Cancer oregensis	9	21	48.5
Cancer sp.	5	6	90.0
Crab, unidentified	3	3	1.5
Crago sp.	1	2	2.0
Mysidae, unidentified	2	4	T
Pandalus danae	1	2	12.0
Petrolisthes eriomerus	1	1	1.0
Shrimp, unidentified	5	6	5.0
Spirontocarus brevirostrus	1	1	2.0
ECTOPROCTA			
Unidentified	2	NC	1.0
CHORDATA			
Engraulis mordax+	3	9	99.0
Fish, unidentified*	6	7	9.5
Hemilepidotus spinosus	1	1	8.0
Sebastes sp.	3	5	4.5
MISCELLANEOUS	5	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 31. 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			
Polychaeta, unid.	1	1	1.0
ARTHROPODA			
Amphipoda	6	42	1.7
*Cancer magister**	3	7	1.5
Shrimp, unid.	1	1	0.5
CHORDATA			
Salpa, unid.	7	NC	71.5
Sebastes sp.	4	10	0.5
MISCELLANEOUS	1	NC	0.5
TOTAL NUMBER OF STOMACHS EXAMINED	11		
NUMBER EMPTY	3		

* = megalops

NC = Not countable

TABLE 32. 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	T
Sertularella sp.	1	NC	T
MOLLUSCA			
Calliostoma costatum	1	1	T
Eulamellibranchia, Unid.	2	3	2.8
Fusinus luteopictus	1	6	2.0
Haliotis sp.	1	1	5.5
*Polypus hongkongensis**	6	30	-
ARTHROPODA			
Cancer antennarius	1	1	29.0
Cancer oregensis	6	14	51.5
Cancer sp.	3	3	12.0
Crab, unid.	1	3	0.5
Chthamalus sp.	1	2	T
Crustacea, unid.	1	1	T
Pagurus sp.	1	1	T
Scyra acutifrons	1	3	21.0
ECTOPROCTA			
Unidentified	3	NC	1.0
CHORDATA			
Fish, unidentified	2	2	9.5
Stichaeid, unid.	1	1	3.0
MISCELLANEOUS	1	NC	1.0
TOTAL NUMBER OF STOMACHS EXAMINED	7		
NUMBER EMPTY	0		

* Most remains consisted of beaks.

NC Not countable.

TABLE 33. 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)
Unid. barnacle	1	1	0.25
Cancer productus	1	1	1.0
Decapoda, unid.	1	1	0.25
*Loligo opalescens**	1	1	2.5
Fish, unid.	1	1	0.5
Sebastes sp.	2	9	7.0
TOTAL NUMBER STOMACHS EXAMINED	6		
NUMBER EMPTY	1		

* probably bait

FIGURE 1. Length frequencies of abalone sampled from subtidal stations - Mendocino Power Plant Site - 1972.

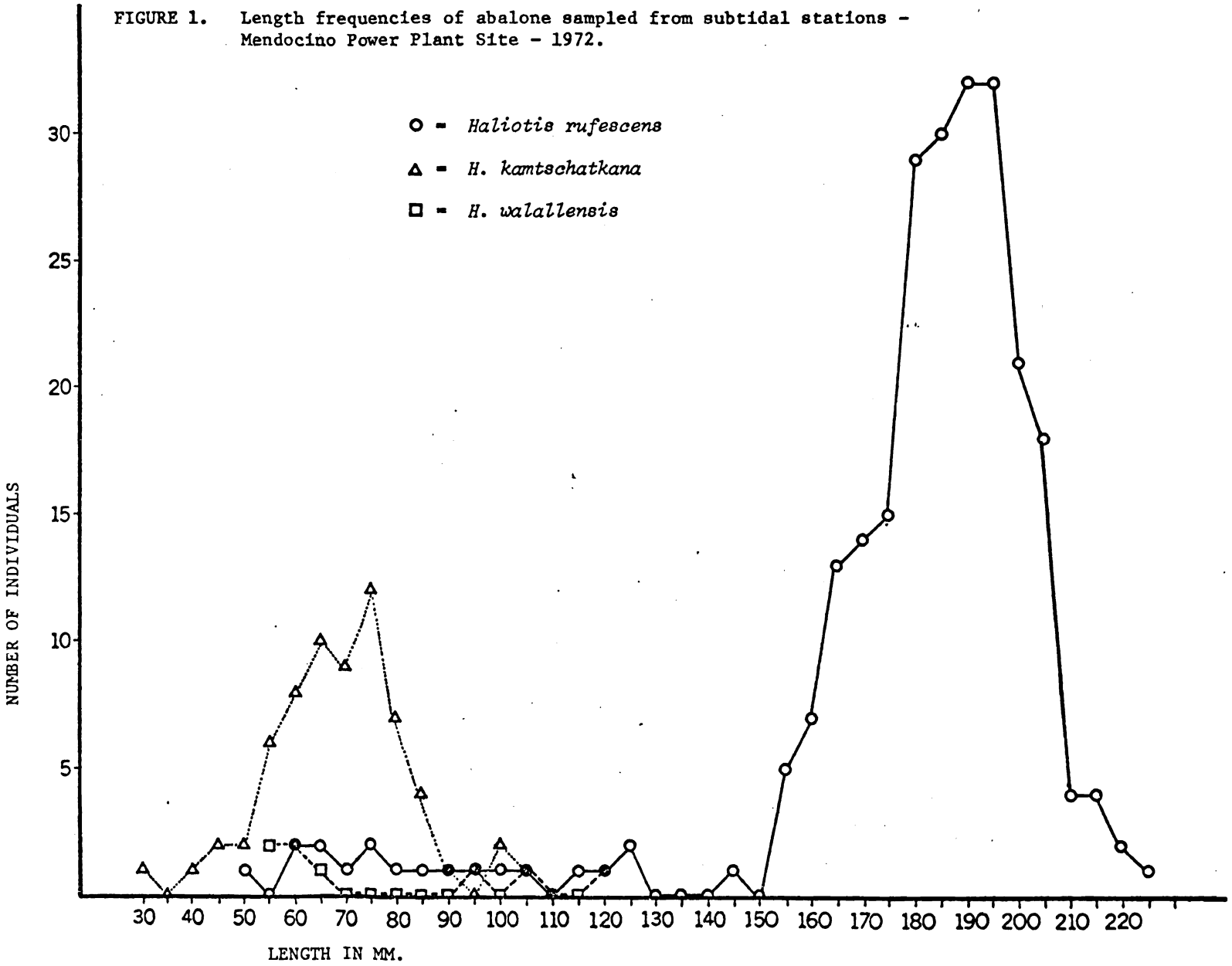


FIGURE 2. Length frequencies of red abalone collected by sportfishermen - Mendocino Power Plant Site - March through December 1972.

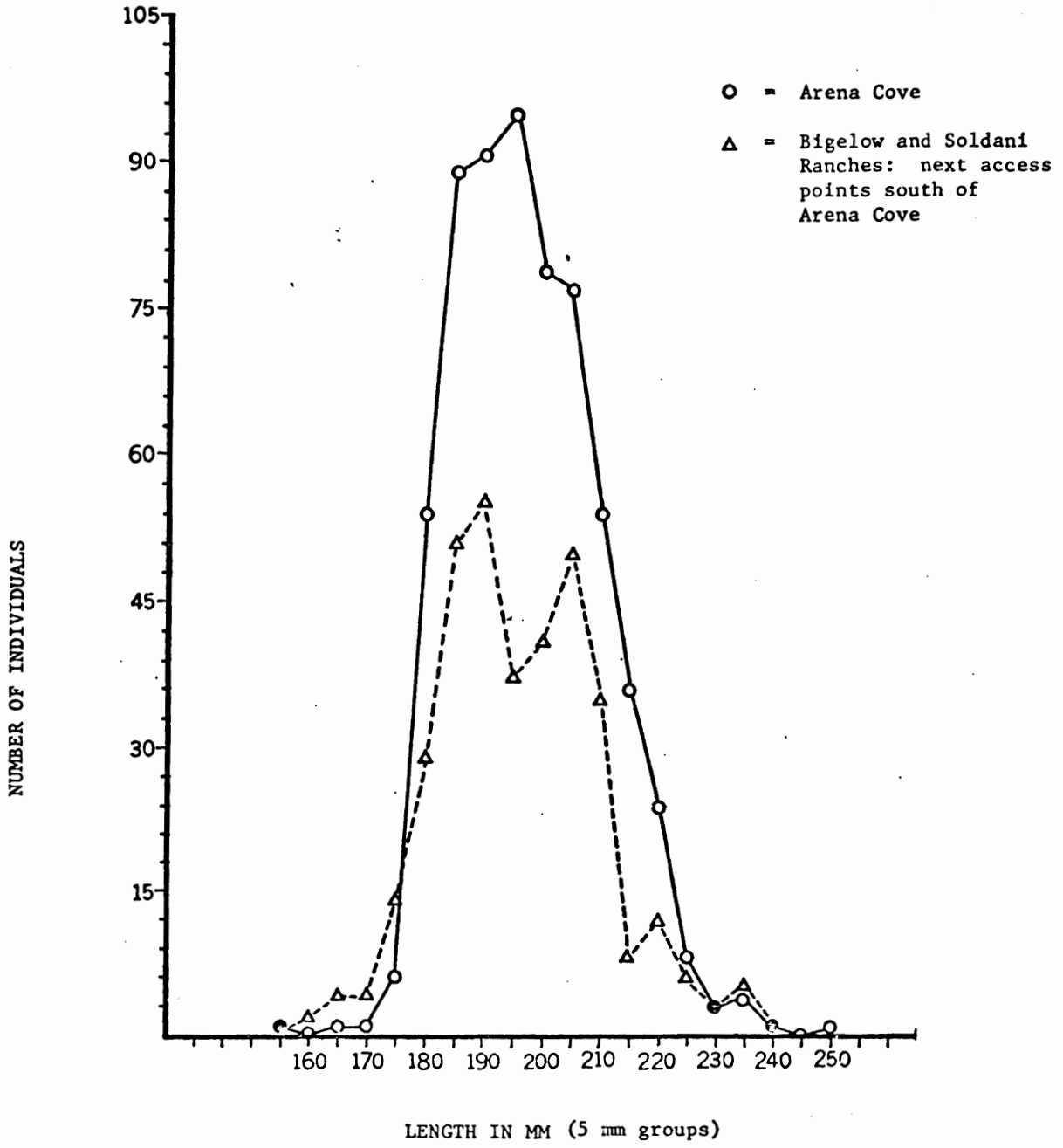


FIGURE 3. Length frequencies of red abalone - collected by sportfishermen - Mendocino Power Plant Site - Davidson Current Period; December 1971 - March 1972.

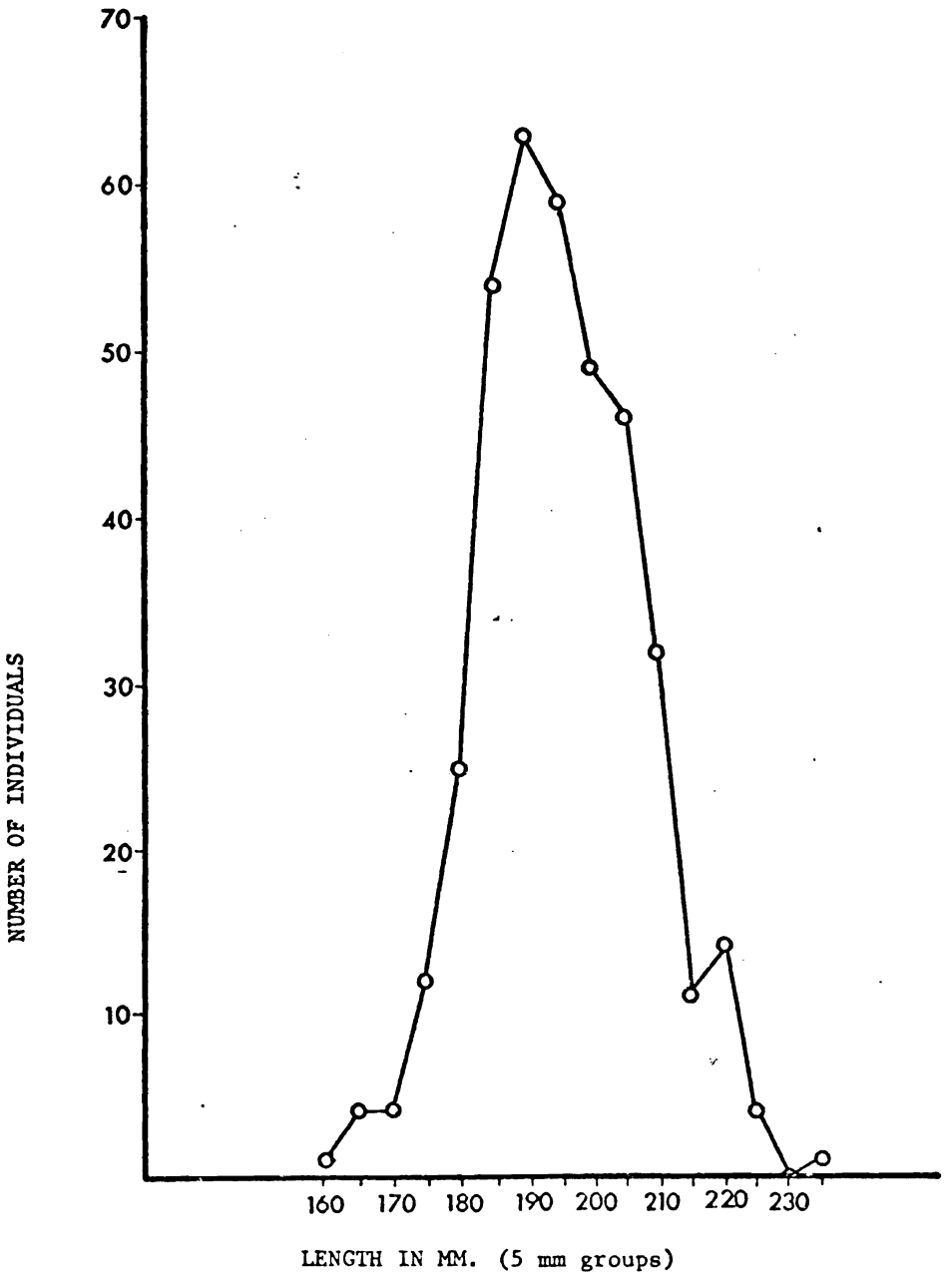


FIGURE 4. Length frequencies of red abalone - collected by sportfishermen - Mendocino Power Plant Site - Upwelling Period; May - July 1972.

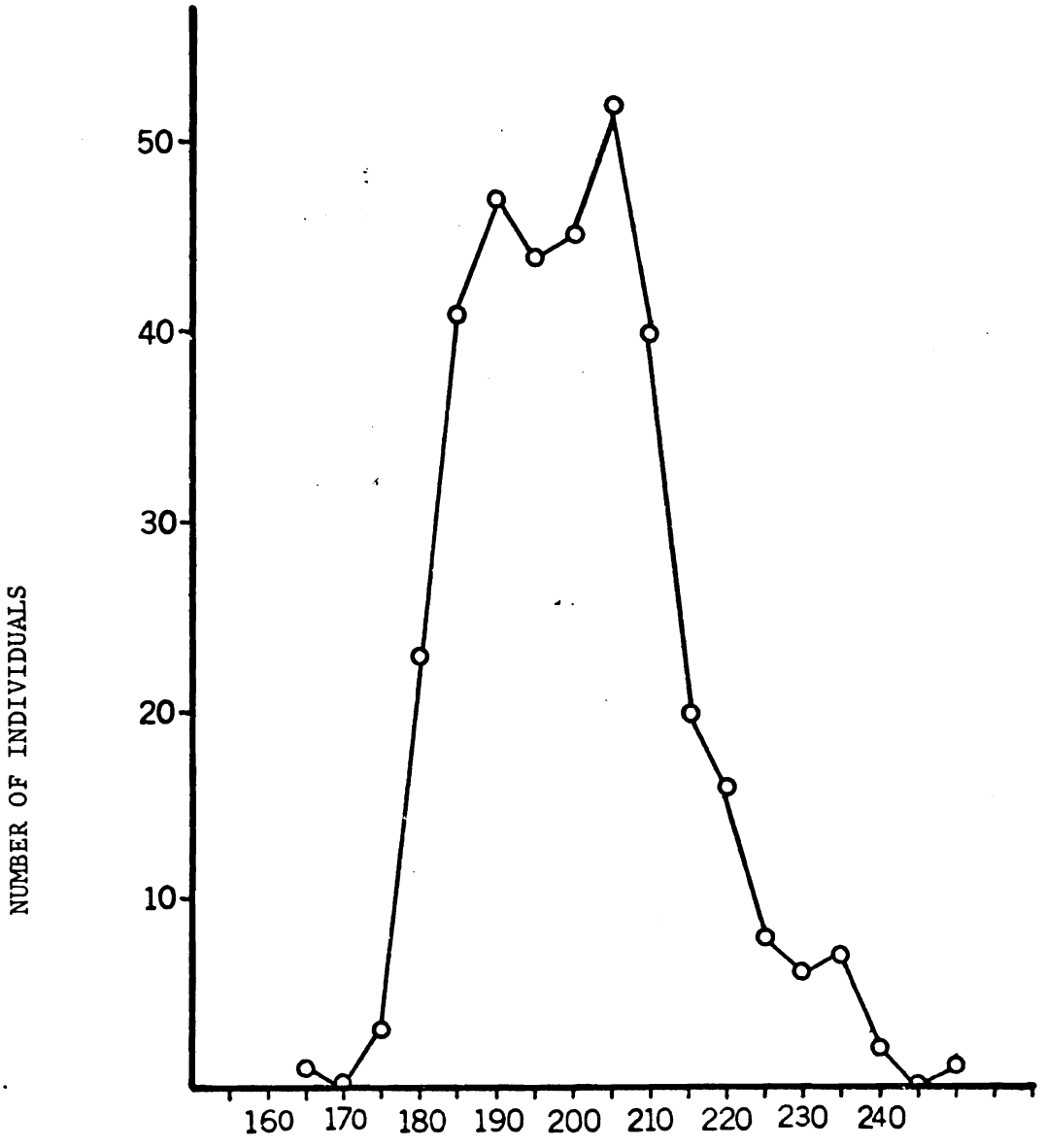
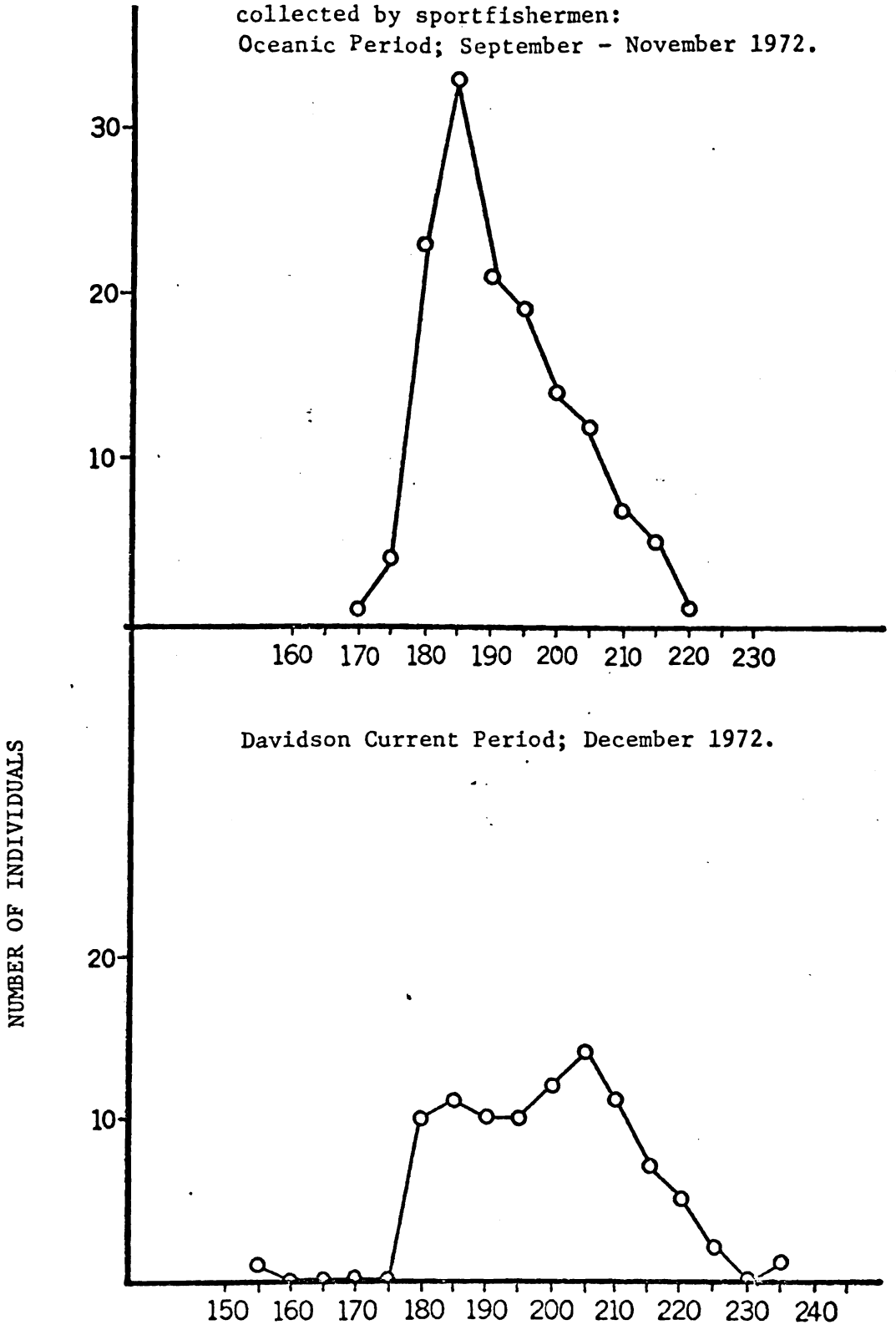


FIGURE 5. Length of red abalone from Point Arena collected by sportfishermen:
Oceanic Period; September - November 1972.



APPENDIX A-1

PROJECT PERSONNEL:

Daniel W. Gotshall, Senior Marine Biologist - Project Leader

Robert N. Lea, Associate Marine Biologist - Assistant Project Leader.

Laurence L. Laurent, Assistant Marine Biologist

Therese L. Hoban, Junior Aquatic Biologist

Margaret M. Hughes, Stenographer II

Jay Baumler, Seasonal Aid (January 1972 - October 1972).

Gary Farrens, Seasonal Aid (October 1972 to present).

Nancy Loomis, Seasonal Aid (April 1972 - July 1972).

Charles Platt, Seasonal Aid (October 1972 to present).

Cathy Short, Seasonal Aid (October 1971 to June 1972).

Arthur Spaletta, Seasonal Aid (September 1971 - December 1971).

NON-PROJECT PERSONNEL:

Don Lollock, Senior Marine Biologist - Environmental Services Branch.

Robert Lavenberg, Curator of Fishes - Los Angeles County Museum of Natural History.

Camm Swift, Associate Curator of Fishes - Los Angeles County Museum of Natural History.

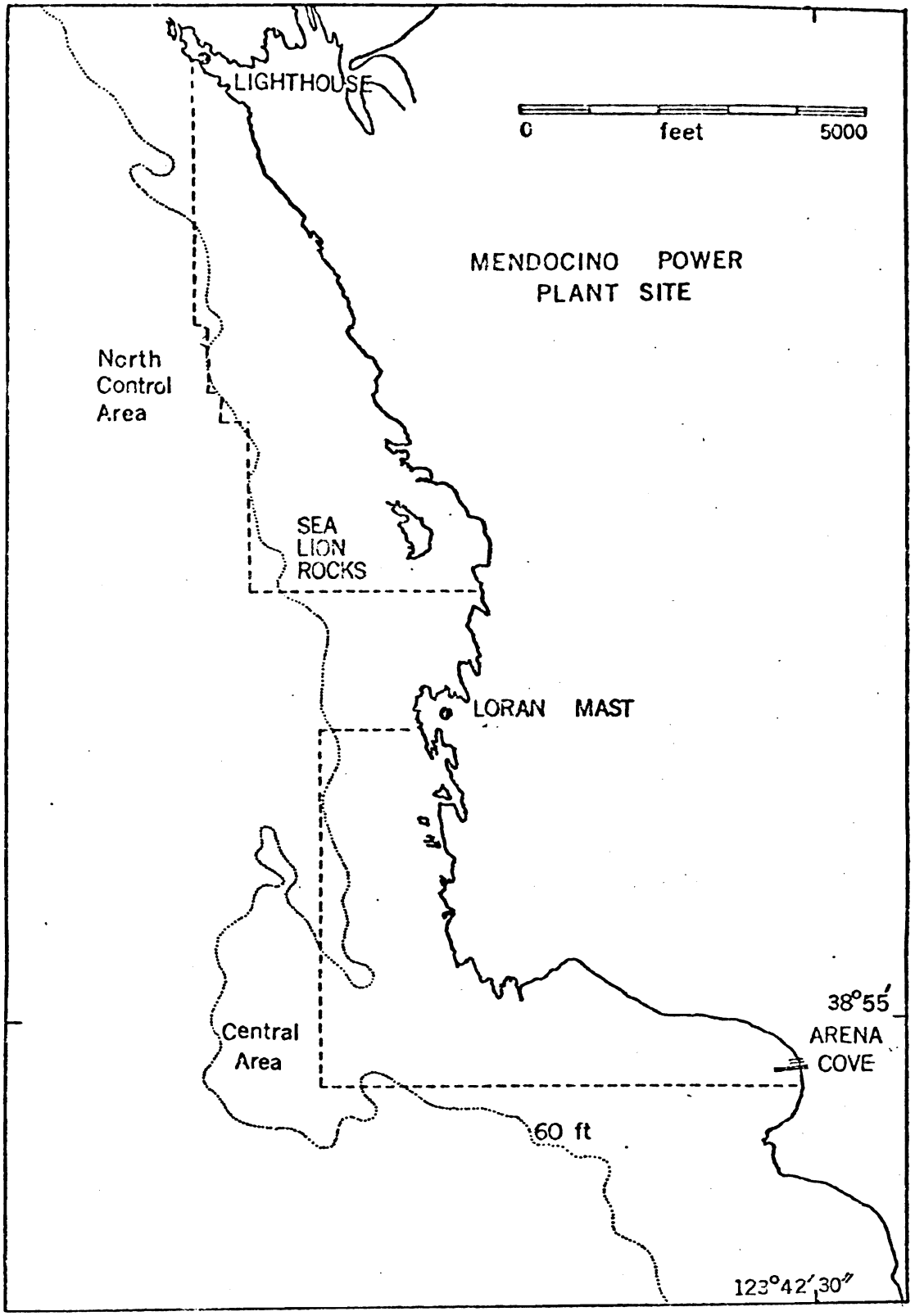
APPENDIX A-2

MAN-DAYS SPENT AT MENDOCINO POWER PLANT SITE

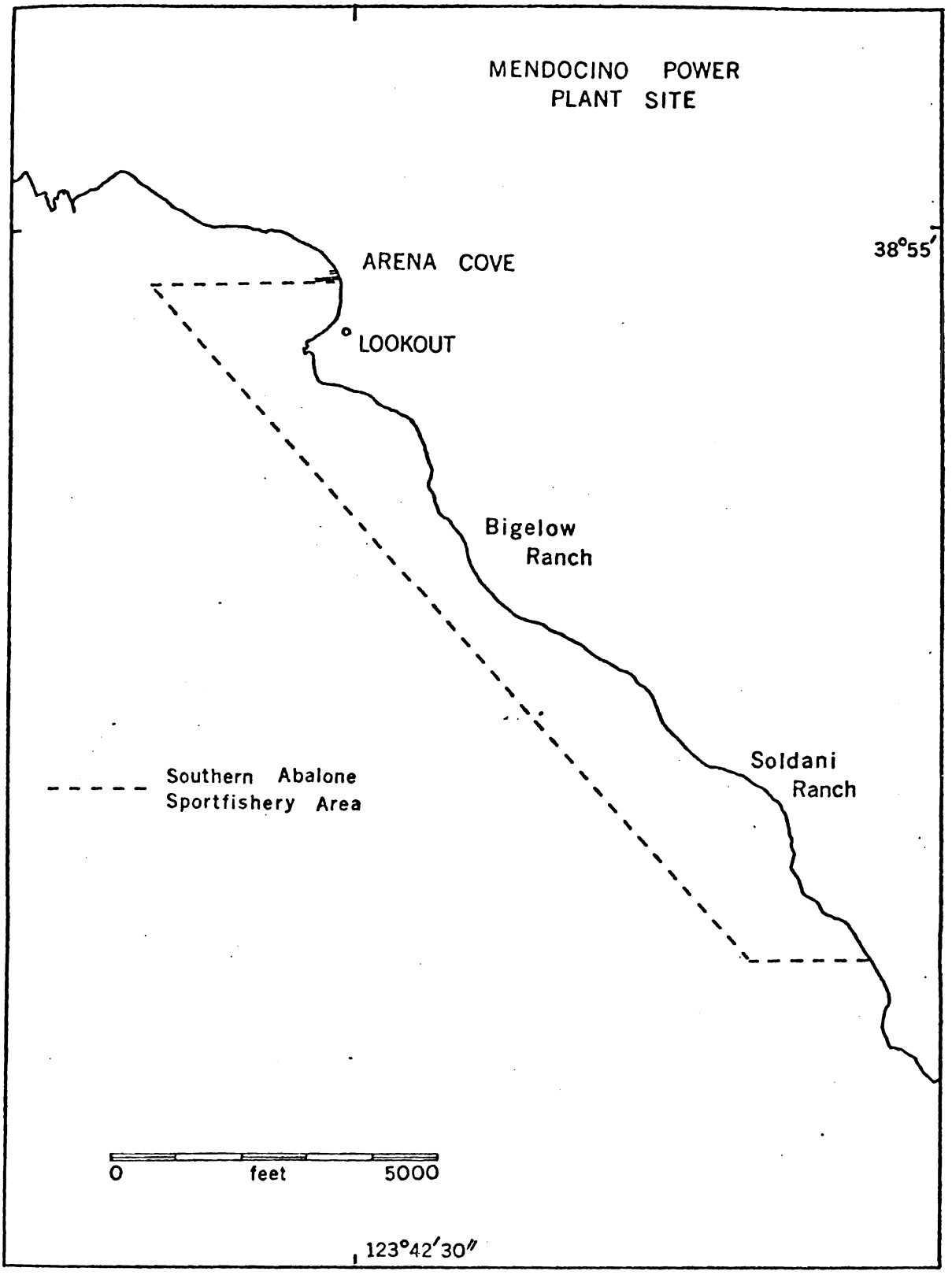
	July 1 - Dec. 31, 1971	Jan. 1 - Dec. 31, 1972	Totals
Total man-days:	259	1477	1736
Total man-days at site:	39	408	447
Boat Time (hours):	35*	125.5	160.5
Boat-days lost to weather:	0	34	34
Total Subtidal Stations sampled:	12	59	71
Total Intertidal Stations sampled:	14	48	62
Travel time man-days:	18	146	164
Laboratory time man-days:	202	923	1125

*20 hours were for Sea Otter Project Ski-Barge.

APPENDIX B


LIGHTHOUSE
0
feet
5000
MENDOCINO POWER
PLANT SITE
North
Control
Area
SEA
LION
ROCKS
LORAN MAST
Central
Area
38°55'
ARENA
COVE
60 ft
123°42'30"

APPENDIX C


MENDOCINO POWER
PLANT SITE
ARENA COVE
38°55'
LOOKOUT
Bigelow
Ranch
Soldani
Ranch
Southern Abalone
Sportfishery Area
0
feet
5000
123°42'30"

APPENDIX D

MAN DAYS SPENT AT MENDOCINO POWER PLANT SITE

October 1 - December 31, 1972

Subtidal and Intertidal Surveys:	October 10 - 15
Participants:	Lea, Farrens
Subtidal Surveys:	October 25 - 29
Participants:	Gotshall, Lea, Farrens
Intertidal Surveys:	November 16 - 20
Participants:	Gotshall, Farrens
Subtidal and Intertidal Surveys:	December 1 - 5
Participants:	Lea, Hoban
Subtidal and Intertidal Surveys:	December 16 - 20
Participants:	Gotshall, Hoban, Farrens

APPENDIX E

Invertebrates Collected and Identified from Subtidal and Intertidal Collections - Mendocino Power Plant Site - July 1, 1971 - December 31, 1972

Scientific Name	Common Name	Subtidal	Intertidal
PHYLUM: PORIFERA			
Haliclona sp.	finger sponge	X	
Leucosolenia sp.	white sponge	X	
Rhabdodermella nuttingi Urban, 1902	sponge	X	
Tethya aurantia (Pallas) *californiana* de Laub., 1932	puffball sponge	X	
PHYLUM: COELENTERATA			
Abietenaria sp.	hydroid	X	X
Aglaophenia sp.	hydroid	X	
Allopora porphyra (Fisher, 1931)	staghorn coral	X	
Anthopleura elegantissima (Brandt, 1835)	aggregate anemone		X
Anthopleura xanthogrammica (Brandt, 1835)	solitary anemone	X	X
Balanophyllia elegans Verill, 1864	solitary coral	X	
Corymorpha sp.	hydroid	X	
Corynactis californica Calgren, 1936	anemone	X	
Epiactis prolifera Verill, 1869	anemone	X	X
Haliclystis stejnegeri	scyphozoan	X	
Metridium senile (Linnaeus, 1767)	white anemone	X	
Tealia crassicornus (Muller, 1776)	anemone	X	X
Tealia lofotensis (Danielssen, 1890)	strawberry anemone	X	
PHYLUM: BRYOZOAN			
Bugula sp.	bryozoan	X	
PHYLUM: ANNELIDA			
Diopatra ornata Moore, 1911	polychaete	X	
Halosydna brevisetosa Kinberg, 1855	scale worm		X

Scientific Name	Common Name	Subtidal	Intertidal
PHYLUM: MOLLUSCA			
Acmaea mitra Eschscholtz, 1833	white cap limpet	X	
Acmaea pelta Eschscholtz, 1833	shield limpet		X
Acmaea persona Eschscholtz, 1833	mask limpet		X
Acmaea sp.	limpet		X
Anisodoris nobilis (MacFarland, 1905)	nudibranch	X	
Archidoris montereyensis (Cooper, 1862)	nudibranch	X	
Astraea sp.	turban	X	
Austrodoris odhneri (MacFarland, 1966)	nudibranch	X	
Bittium attenuatum Carpenter, 1864	bittium		X
Cadlina spp.	nudibranch	X	
Calliostoma costatum (Martyn, 1784)	topshell	X	X
Calliostoma sp.	topshell		X
Callistochiton crassicostatus Pilsbry,1892	chiton	X	
Ceratostoma foliatum (Gmelin)	foliated thorn purpura	X	
Chlamys hastata (Sowerby, 1842)	spear scallop	X	
Crepidula adunca Sowerby, 1825	hooked slipper		X
Crepidula nummaria Gould, 1846	crepidula	X	
Crepidula sp.	crepidula		X
Cryptochiton stelleri (Middendorff, 1846)	gumboot chiton	X	X
Dendorodoris sp.	nudibranch	X	
Dialula sandiegensis (Cooper, 1862)	nudibranch	X	
Diodora aspera (Eschscholtz, 1833)	rough keyhole limpet	X	
Dirona picta MacFarland in Cockerell and Elliot, 1905	nudibranch	X	
Duvaucelia sp.	nudibranch	X	
Epitonium indianorum (Carpenter)	money wentletrap		X
Fusinus luteopictus (Dall, 1877)	spindle shell	X	X
Haliotis kamtschatkana Jonas, 1845	pinto abalone	X	

Scientific Name	Common Name	Subtidal	Intertidal
Haliotis rufescens Swainson, 1822	red abalone	X	X
Haliotis wallalensis Stearns, 1899	flat abalone	X	X
Hermissenda crassicornis (Eschscholtz, 1831)	nudibranch	X	
Hinnites multirugosus (Gale, 1928)	rock scallop	X	
Katharina tunicata (Wood, 1815)	black chiton		X
Littorina sp.	periwinkle		X
Mitrella carinata (Hinds, 1844)	carinate dove shell snail		X
Mopalia hindsii (Reeve, 1847)	chiton		X
Mopalia lignosa (Gould, 1846)	chiton		X
Mopalia muscosa (Gould, 1846)	chiton		X
Mytilus californianus Conrad, 1837	California mussel		X
Notirus lamellifer (Conrad, 1837)	notirus	X	
Nuttalina californica (Reeve, 1847)	chiton	X	
Oncidiella sp.	oncidiella		X
Placiphorella velata Carpenter in Dall, 1878	chiton	X	
Polinices sp.	moonsnail	X	
Polypus hongkongensis	octopus		X
Rostangia pulchra MacFarland, 1905	nudibranch	X	X
Tegula brunnea (Philippi, 1848)	brown turban	X	X
Tegula funebralis (Adams, 1854)	black turban	X	X
Tegula sp.	turban snail	X	X
Thais emarginata (Deshayes, 1839)	emarginate dogwinkle		X
Tonicella lineata (Wood, 1815)	lined chiton	X	X
PHYLUM: ARTHROPODA			
Amphithoe lacertosa (Bate, 1858)	gammarid		X
Amphithoe simulans Alderman, 1936	gammarid		X
Balanus glandula Darwin, 1854	barnacle	X	

Scientific Name	Common Name	Subtidal	Intertidal
Balanus sp.	barnacle	X	X
Cancer antennarius Stimpson	rock crab	X	X
Cancer jordani Rathbun, 1900	crab		X
Cancer magister Dana, 1852	market crab	X	
Cancer oregonensis (Dana, 1852)	Oregon cancer crab	X	X
Cancer productus Randall, 1839	red crab		X
Cancer sp.	crab	X	X
Caprella spp.	caprellid	X	X
Crago sp.	shrimp	X	
Cryptolithoides sitchensis Brandt, 1853	umbrella-backed crab	X	
Haplogaster cavicauda Stimpson, 1859	crab		X
Hyale rubra frequens (Stout, 1913)	gammarid		X
Idothea stenops (Benedict, 1898)	isopod		X
Lophopanopeus bellus (Stimpson, 1860) (1862)	crab		X
Loxorhynchus crispatus Stimpson, 1875	masking crab	X	X
Mimulus foliatus Stimpson, 1860	crab	X	X
Oedignathus inermis (Stimpson, 1860)	crab		X
Oligochinus lighti Barnard, 1969	gammarid		X
Pachycheles rudis Stimpson, 1859 (1860)	crab	X	
Pagurus granosimanus (Stimpson, 1859)	hermit crab	X	
Pagurus sameulis (Stimpson, 1857)	hermit crab	X	
Pagurus sp.	hermit crab	X	X
Parallorchestes anceps	gammarid		X
Parallorchestes ochotensis (Brandt,1851)	gammarid		X
Pollicipes polymerus (Sowerby, 1833)	goose-neck barnacle		X
Pugettia gracilis Dana, 1851	kelp crab	X	X
Pugettia producta (Randall, 1839)	kelp crab	X	X
Scyra acutifrons Dana, 1852	crab	X	
Spirontocaris brevirostris (Dana, 1852)	shrimp		X

Scientific Name	Common Name	Subtidal	Intertidal
PHYLUM: ECHINODERMATA			
Cucumaria miniata Brandt, 1835	sea cucumber	X	
Dermasterias imbricata (Grube, 1857)	leather star	X	
Eupentacta quinquesemita (Selenka, 1867)	sea cucumber	X	
Henricia leviuscula (Stimpson, 1857)	sea star	X	X
Leptasterias pusilla (Fisher, 1911)	sea star	X	X
Mediaster aequalis Stimpson	sea star	X	
Ophioplocus esmarki Lyman, 1874	brittle star	X	
Orthasterias koehleri (DeLoriol)	sea star	X	X
Patiria miniata (Brandt, 1835)	bat star	X	
Pisaster brevispinus (Stimpson, 1857)	sea star	X	
Pisaster giganteus (Stimpson, 1857)	sea star	X	
Pisaster ochraceous (Brandt, 1835)	sea star	X	X
Psolus chitonoides Clark, 1902	sea cucumber	X	
Pteraster sp.	sea star	X	
Pycnopodia helianthoides (Brandt, 1835)	sunflower star	X	X
Solaster dawsoni Verill, 1878	twelve-arm sunstar	X	
Solaster stimpsoni Verill	sun star	X	
Stichopus californicus (Stimpson, 1857)	sea cucumber	X	
Strongylocentrotus franciscanus (Agassiz)	red urchin	X	
Strongylocentrotus purpuratus (Stimpson)	purple urchin	X	X
PHYLUM: SIPUNCULIDA			
Phascolosoma agassizii Keferstein, 1866	peanut worm		X
PHYLUM: CHORDATA			
Styela montereyensis (Dall, 1872)	tunicate	X	