CHANNEL ISLANDS NATIONAL PARK
KELP FOREST MONITORING

1991 Annual Report

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This document describes the 1991 progress of the Channel Islands National Park Kelp Forest Monitoring Project. Population dynamics of 68 indicator species of algae, fish, and invertebrates were measured at 16 permanent transect sites in 1991 by divers using SCUBA and surface-supply-air. Survey dives were conducted at seven other locations for comparisons and general information. In 1991, nine sites had healthy kelp forests. Five others had some kelp growing on or near the transect, but were dominated somewhat by sea urchins. White sea urchins were present in moderate to high numbers at four sites with declines at two sites and an increase at one. Juvenile fish recruitment was down in 1991; however, young-of-year rockfish were numerous at San Miguel Island and juvenile sheephead and garibaldi were common at Santa Barbara and Anacapa Islands. Abalone recruitment modules proved effective at concentrating juveniles of several species. This year was a poor recruitment year for abalone.

EXECUTIVE SUMMARY

The Channel Islands kelp forests are an important part of southern California's marine ecosystem and economy. Channel Islands National Park has conducted long-term ecological monitoring of the kelp forests around Santa Barbara, Anacapa, Santa Cruz, Santa Rosa and San Miguel islands since 1982. Permanent transects were established at 16 stations between 1981 and 1986. The stations were monitored during eight five-day cruises between June and October. Survey techniques utilizing SCUBA or surface-supply air include; quadrat counts, band transect counts, random point contact quadrat counts, fish transect counts, video transects, photogrammetric plots, size frequency measurements, and species list surveys. The 1991 kelp forest monitoring marks our tenth year of data collection and was completed by 46 National Park Service (NPS) and volunteer divers making over 850 dives.

In 1991, nine of the 16 transects had healthy kelp forests, including all three Anacapa Island sites, Yellow Banks and Gull Island on the south side of Santa Cruz Island, all three Santa Rosa Island sites, and Wyckoff Ledge on the south side of San Miguel Island. Cat Canyon and Arch Point on Santa Barbara Island had some kelp along the transect though the purple sea urchin densities were still high. Kelp grew near

transects at Pelican Bay on Santa Cruz Island, Southeast Sea Lion Rookery on Santa Barbara Island, and Hare Rock San Miguel Island. Hare Rock had the highest density of red sea urchins and Southeast Sea Lion Rookery had the highest density of purple sea urchins. Fry's Harbor on Santa Cruz Island had moderate densities of understory brown algae, primarily southern sea palm, but continued to be dominated by the small aggregated red sea cucumbers. White sea urchins were also common in areas of Fry's Harbor. Scorpion Anchorage on Santa Cruz Island, remains a complete barren with very little algae, a high density of purple sea urchins, and generally low species diversity.

Fewer species of juvenile fish were seen in 1991 than in 1990; however, young-of-the-year and juvenile fish were observed at some sites. Numerous young-of-the-year rockfish were observed in the kelp canopy at Wyckoff Ledge. Juvenile sheephead and garibaldi were abundant at sites on Santa Barbara and Anacapa Islands. Juvenile rockfish and surfperch were abundant at Johnson's Lee North, Santa Rosa Island. Several coldwater species were observed including kelp greenling at San Miguel Island and tubesnouts at Anacapa Island. Tubesnouts were seen spawning at San Miguel Island.

Abalone recruitment modules were built and placed by the Channel Islands Council of Divers at three Anacapa Island sites. This was a cooperative volunteer effort with the National Park Service, California Department of Fish and Game, and Southern California Edison. Red abalone were transplanted to two of the sites. Recruitment modules at Yellowbanks and Gull Island on Santa Cruz Island, and Johnson's Lee North, Santa Rosa Island were monitored for the second year. Few of the original red abalone transplanted in 1990 were found. Survival of the transplants was greatest at Johnson's Lee North.

This year seemed to be a poor recruitment year for abalone. Some young native abalone recruits were found in the recruitment modules, but numbers were low, and in natural habitat where we generally find young abalone, there were few. The modules worked well to attract other young animals and the recommendation is made to use the modules for monitoring size frequencies of sea urchins, sea stars, and possibly other invertebrates.

Sea star wasting disease was observed in bat stars and ochre stars at Gull Island and Fry's Harbor in 1991; however, the severity seemed to be less than in 1990. Juvenile sea stars

were observed at several sites. Young sunflower stars were found at Rodes Reef, Santa Rosa Island and Admiral's Reef, Anacapa Island. Cathedral Cove, Anacapa Island had good recruitment of bat stars and recently settled sea stars were observed on sponges along the north side of Santa Cruz Island.

White sea urchin densities were down overall at Southeast Sea Lion Rookery, Fry's Harbor, Yellow Banks, and Admiral's Reef where they have been most numerous in the past. Southeast Sea Lion was the only site with an increased abundance of white sea urchins. Densities remained unchanged at Fry's Harbor. Large accumulations of fresh white sea urchin tests were observed, most notably at Yellowbanks.

Modifications were made to several of the data management programs to maintain consistency with new hardware used by the park and improve our abilities to present the data. Maintenance of the permanent transects in 1991 included replacing the leadline transects at most stations. Kelp Forest Monitoring Project divers assisted with California Department of Fish and Game abalone surveys in Mendocino and with surveys of Santa Catalina Island for the Channel Islands Research Project.

INTRODUCTION

The waters of Channel Islands National Park and Channel Islands National Marine Sanctuary harbor one-third of southern California's kelp forests (Davies, 1968). The giant kelp, Macrocystis pyrifera is the primary constituent of these kelp forests and over 1,000 species of macro flora and fauna can be found here (Woodhouse 1981, J. M. Engle pers. comm.). Many other species, while not residents of the kelp forest community, are dependent upon the existence and productivity of the kelp forest. The kelp forest serves as food, shelter, substrate and nursery to migratory as well as resident species. Kelp forest detrital flux provides an important source of nutrients to nearby rocky shore, sandy beach and estuary communities. The kelp forests are essential to our commercial and sport fisheries as well as to recreation and the associated tourist industry.

Channel Islands National Park consists of five of the eight California Channel Islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara) and the submerged lands and waters within one nautical mile of each of the islands. The Channel Islands National Marine Sanctuary overlaps the

subtidal portions of the park, and its boundary extends six miles seaward from the park islands. Channel Islands National Park also bears the designation of International Biosphere Reserve and State of California Areas of Special Biological Significance. The State of California maintains jurisdiction over the park's marine resources and manages them through the Department of Fish and Game.

The federal law which established Channel Islands National Park (16-USC-410) directed development of inventories and monitoring of natural resources in the park. Kelp forest monitoring is part of the long-term ecological monitoring at the park designed to measure the health of the ecosystems. By determining the limits of normal variation and diagnosing abnormal conditions we hope to prescribe remedial action through management recommendations.

Following a five year design study begun in 1982, the kelp forest monitoring was implemented in 1987 by the park resource management division, using the protocol established during the design phase. Monitoring design rationale is discussed in Davis and Halvorson (1988). Preliminary results and specific design considerations can be found in reports written by Davis (1985, 1986). Richards, Gramlich, and Davis (1993), describe

monitoring efforts and results for 1982-1989. The 1990 monitoring efforts and results are described in Richards, Avery, and Kushner (1993).

This report summarizes the monitoring efforts and results from 1991, our tenth year of monitoring. It is hoped that these reports will provide some insight into kelp forest dynamics and stimulate further research into the long-term trends and changes in the nearshore ecosystem. We have highlighted some of the most important observations at each of the stations, and tried to provide a characterization for each site. When possible, organisms are referred to by common name and cross referenced to their scientific names in Table 1.

METHODS

Population dynamics of 68 taxa or "target species" (Table 1) were measured at 16 fixed sites (Table 2) around the five park islands (Fig. 1). Site and species selection criteria are provided in the Kelp Forest Monitoring Handbook (Davis, 1988). Sites were monitored between June and October of 1991.

Each site is marked by a 100 m-long transect permanently affixed to the seabed. The sampling techniques employed to

gather population dynamics information are summarized in Table 3. At each station, randomly placed 1 m x 2 m quadrats and 3 m x 20 m band transects were used to determine densities and distribution of discrete benthic organisms; 1000 randomly selected points (RPCs) were used to determine percent cover of encrusting invertebrates, algae, and substrate composition; 2 m x 3 m x 100 m fixed transects were used to determine fish abundance; video taped transects and video taped 20 m^2 photogrammetric plots provide a record of the site appearance; and size frequency measurements were collected to determine age structure, population recruitment, and growth rates. A general species list was made for each station, noting presence/absence and relative abundance for all recognizable species.

In 1991 we decided to terminate size frequencies for the warty sea cucumber and chestnut cowrie. We felt that our sampling excluded juveniles of both species and so the time used for measuring these animals could be better used elsewhere. The video camera was used exclusively for the photoplots in 1991 eliminating the use of still plots. Photoplots were not video taped at Hare Rock, Yellow Banks, and Cat Canyon because the marker-stakes could not be found.

Table 1. Regularly monitored species by taxonomic grouping, common name, scientific name and associated monitoring technique.

TAXA/COMMON NAME	SCIENTIFIC NAME	TECHNIQUE
ALGAE		
Miscellaneous Green Algae		R
Miscellaneous Red Algae		R
Articulated Coralline Algae		R
Crustose Coralline Algae		R
Agar weed	*Gelidium spp.*	R
Sea tongue	*Gigartina spp.*	R
Miscellaneous Brown Algae		R
Acid weed	*Desmarestia spp.*	R
Oar weed	*Laminaria farlowii*	R,Q
Bladder chain kelp	*Cystoseira spp.*	R
Giant kelp	*Macrocystis pyrifera*	R,Q
California sea palm	*Pterygophora californica*	R,Q
Southern sea palm	*Eisenia arborea*	R,Q
Miscellaneous plants		R
INVERTEBRATES		
Miscellaneous Sponges		R
Orange puffball sponge	*Tethya aurantia*	B,S
Southern staghorn bryozoan	*Diaperoecia californica*	R
Miscellaneous Bryozoans		R
California hydrocoral	*Allopora californica*	B,S
White-spotted rose anemone	*Tealia lofotensis*	B
Red gorgonian	*Lophogorgia chilensis*	B,S
Brown gorgonian	*Muricea fruticosa*	B,S
California golden gorgonian	*Muricea californica*	

		B,S
Strawberry anemone	Corynactis californica	
		R
Orange cup coral	Balanophyllia elegans	R
La Jolla cup coral	Astrangia lajollaensis	
		R
Hydroids		
		R
Ornate tube worm	Diopatra ornata	R
Colonial sand-tube worm	Phragmatopoma californica	
		R
Chestnut cowrie	Cypraea spadicea	Q
Wavy turban snail	Astraea undosa	
		Q,S
Red turban snail	Astraea gibberosa	
		Q,S
Bat star	Patiria miniata	
		Q,S
Giant-spined sea star	Pisaster giganteus	
Q,S		
Sunflower star	Pycnopodia helianthoides	
		B,S
White sea urchin	Lytechinus anamesus	
B,S		
Red sea urchin	Strongylocentrotus franciscanus	
		Q,S
Purple sea urchin	Strongylocentrotus purpuratus	
		Q,S
Warty sea cucumber	Parastichopus parvimensis	
		Q
Aggregated red sea cucumber	Pachythyone rubra	
		R
Red abalone	Haliotis rufescens	
B,S		
Pink abalone	Haliotis corrugata	
		B,S
Green abalone	Haliotis fulgens	
		B,S

Table 1 continued.

TAXA/COMMON NAME	SCIENTIFIC NAME	TECHNIQUE
Kellet's whelk	Kelletia kelletii	B,S
Giant keyhole limpet	Megathura crenulata	B,S
California brown sea hare	Aplysia californica	B
Scaled tube snail	Serpulorbis squamigerus	R
Rock scallop	Hinnites giganteus	B,S
California spiny lobster	Panulirus interruptus	B
Tunicates		R
Stalked tunicate	Styela montereyensis	Q
Miscellaneous Invertebrates		R
SUBSTRATE		
Bare Substrate		R
Substrates: Rock		R
Cobble		R
Sand		R
FISH		
Bluebanded goby	Lythrypnus dalli	Q
Blackeye goby	Coryphopterus nicholsii	Q
Island kelpfish	Alloclinus holderi	Q
Blacksmith	Chromis punctipinnis	V
Señorita	Oxyjulis californica	V
Blue rockfish	Sebastes mystinus	V
Olive rockfish	Sebastes serranoides	V
Kelp rockfish	Sebastes atrovirens	V
Kelp bass	Paralabrax clathratus	V

Sheephead	*Semicossiphus pulcher*	V
Black surfperch	*Embiotoca jacksoni*	V
Striped surfperch	*Embiotoca lateralis*	V
Pile perch	*Damalichthys vacca*	V
Garibaldi	*Hypsypops rubicundus*	V
Opaleye	*Girella nigricans*	V

B= Band Transect
Q= Quadrat Count
R= Random Point Contact
S= Size Frequency Measurement
V= Visual Transect

Table 2. Station information.

STATION NUMBER	ISLAND	LOCATION	ABBREVIATION	DEPTH (FEET)	YEAR EST.
1	San Miguel	Wyckoff Ledge	SMIWL	43-49	1981
2	San Miguel	Hare Rock	SMIHR	20-30	1981
3	Santa Rosa	Johnson's Lee North	SRIJLNO	31-36	1981
4	Santa Rosa	Johnson's Lee South	SRIJLSO	46-52	1981
5	Santa Rosa	Rodes Reef	SRIRR	43-49	1983
6	Santa Cruz	Gull Island South	SCIGI	45-54	1981
7	Santa Cruz	Fry's Harbor	SCIFH	39-42	1981
8	Santa Cruz	Pelican Bay	SCIPB	21-27	1981
9	Santa Cruz	Scorpion Anchorage	SCISA	15-20	1981
10	Santa Cruz	Yellowbanks	SCIYB	48-51	1986
11	Anacapa	Admiral's Reef	ANIAR	42-49	1981
12	Anacapa	Cathedral Cove	ANICC	20-35	1981
13	Anacapa	Landing Cove	ANILC	15-40	1981

14	Santa Barbara	SE Sea Lion Rookery	SBISESL	40-46	1981
15	Santa Barbara	Arch Point	SBIAP	22-27	1981
16	Santa Barbara	Cat Canyon	SBICC	22-30	1986

Table 3. Summary of sampling techniques used to monitor population dynamics of selected kelp forest organisms.

TECHNIQUE	SAMPLE SIZE	NUMBER OF REPLICATES
Quadrat count	1 m X 2 m	20 / site
Band Transect count	3 m X 20 m	12 / site
Random Point count	40 points (0.5 x 3 m)	25 / site
Visual Fish transect	2(w) X 3(h) X 100(l) m 5 minutes	8 / site
Video transects	5 minutes/100 m	4 / site
Size frequency	30 to 100 / species	1 / site
Photogrammetric plots	20 m^2 (80-0.5 x 0.5 m)	1 / site
Species checklist	30 - 90 minutes	1 / site

STATION RESULTS AND DISCUSSION

Sampling was completed at all 16 monitoring sites by 46 divers during seven five-day and one four-day cruises plus day trips (Table 5). A total of 844 dives, with 609.5 hours of bottom time, were completed during the regular cruises. An additional 40 dives were made on day trips to monitor abalone recruitment modules.

This year several areas besides the transect sites were surveyed. General observations and species lists were made. A brief description of each site is included with the station summaries below. A summary of the 1991 status of each site is presented in Table 4. A general discussion with recommendations follows. Summary tables for quadrats, band transects, random point contact quadrats (RPCs), fish transects, and size frequencies for all 16 stations can be found in Appendix A. Species lists for the 16 stations are in Appendix B.

Wyckoff Ledge, San Miguel Island

Station #1 SMIWL

1991 sampling dates: 7/23, 7/24, 10/15, 10/16

1991 status: dense kelp forest

There was a very dense kelp canopy over the site in July, with surface canopy at about 100% cover. Kelp coverage on the bottom was 23%. Despite the dense canopy creating a low light condition, red algae on the bottom was very dense (62%) and diverse. Sea tongue covered another 7%. Articulate coralline algae was also abundant at 14%. During the October sampling, the kelp canopy was less dense than it was in July, the color of the kelp was rather pale, and many of the blades were tattered. Bladeless, broken stipes littered the area.

Ornate tube worms were abundant in the sandy areas, dominating 14% of the surface. Bryozoans, sandcastle worms, and sponges were abundant on rocks. The worm Pista elongata and hydroids were the most common miscellaneous invertebrates on RPCs.

Rock crabs were common. Small kelp crabs (Pugettia richii) seemed to be everywhere and were easily seen in their bright red colors. Kelp crabs, Pugettia producta seemed to be more abundant in October compared to July. Mysids, isopods (Idotea resecata), and kelp curler amphipods were common in the kelp canopy. In October, Larvaceans were common in the water column, as were mysids over the sand.

Kellet's whelks were abundant, and the sunflower star was recorded at its highest level on band transects. Purple and red sea urchins were uncommon with densities of $0.1/m^2$ and $0.6/m^2$ respectively.

Large rockfish were common. Juvenile rockfish were abundant. Young-of-the-year rockfish (approximately 1-2 cm) were present in high numbers in the canopy. Schools of tubesnouts were observed and several nests with eggs were found in July, while no nests were found in October. Large lingcod were observed on both visits. In October a kelp greenling was observed, this is the southern limit of its range. A small sample of gut contents revealed that kelp rockfish and olive rockfish have been eating kelp isopods (Idotea resecata) and a copper rockfish had eaten an octopus.

Hare Rock, San Miguel Island

Station #2 SMIHR

1991 sampling dates: 7/22, 7/25, 10/16

1991 status: red sea urchin dominated

Except for some ephemeral algae, the site was mostly barren

and dominated by red sea urchins at a mean of 11/m^2. The red sea urchins had small bodies (58 mm mean size) and long spines that have been associated with poor food conditions. The entire area surrounding the transect was dominated by red sea urchins. Purple sea urchins were present at 2/m^2. In shallow areas, especially near kelp plants, there were some small purple sea urchin aggregations.

There were several acid weed plants growing in the transect area and an occasional patch of red or green algae on rock tops. A few giant kelp plants were growing outside the transect, but they were heavily encrusted with bryozoans and barely reached the surface. Bat stars and giant-spined sea stars were common (2.1 and 1.1/m^2 respectively). One reef south of the transect had a very high density of giant-spined sea stars.

In July, adult and juvenile rockfish were abundant. Sheephead, and both striped and black surfperch were common. In October, Cabezon, scorpion fish, sheephead, schools of blue rockfish, blacksmith, and many juvenile and adult rockfish were noted.

In four dives, only one adult and 20 juvenile red abalone were found in the July sampling along the transects. In October

several dozen red abalone were found inshore from the transect while snorkeling. The abalone were found in depths less than 20 feet deep, mostly in the open, on top of rocks. In shallow areas on Hare Rock at least a dozen more sub-legal red abalone and several black abalone were found.

Clouds of mysids were present near the bottom as they have been for the last few years. In July, two basking sharks were observed just outside Hare rock and later in Cuyler Harbor close to the beach. Swarms of copepods were observed at Hare Rock and were probably the prey of the sharks.

Castle Rock, San Miguel Island. We made survey dives in two areas on the north side of Castle Rock and made species lists. Some red abalone counts and measurements were made. The area was very beautiful with high relief rocky reefs, covered by abundant coralline algae and a mosaic kelp forest with alternating open and dense patches. Large rockfish, perch, sheephead, and lingcod were abundant. Small (100 mm) red abalone were commonly found in holes in the rocks while adults near legal size were out in the open. Large red sea urchins were common. The feather duster worm, Eudistylia polymorpha

were abundant. Two small patches of purple California hydrocoral were found.

Johnson's Lee North, Santa Rosa Island

Station #3, SRIJLNO

1991 sampling dates: 6/12, 8/5, 8/6, 8/7, 10/3

1991 status: dense young kelp forest.

Giant kelp was dense, but many of the plants were young with small holdfast diameters (mean = 23 cm), and low numbers of stipes (mean = 7), most of which just reached the surface so the canopy was not especially thick. Juvenile giant kelp were abundant in patches. Understory algae such as the bladder chain kelp, acid kelp, and California sea palm were abundant in some areas. The brown algae combined gave a 90% cover at the site. Despite all the kelp, miscellaneous red algae and sea tongue combined for a 38% cover.

Bryozoans and tunicates were abundant, together reaching 43% cover. Hydroids (Plumularia sp. and Hydractinia milleri) were the most abundant miscellaneous invertebrates on RPCs. The stalked tunicate was fairly abundant for the third year, appearing in virtually all the quadrats.

Red and purple sea urchin densities were very low, 0.45/m^2 and 0.25/m^2 respectively. The sea urchins were primarily restricted to crevices. Red sea urchin density declined between 1989 and 1990, and in 1991 densities remained a fraction of their 1989 level. It is difficult to say whether this decrease is due to sea urchin harvesting or predation (possibly by the sunflower star which increased 3 fold in 1990, then dropped back off in 1991). Red sea urchins were large with a mean size of 87 and almost 80% being above legal size (75 mm). Giant-spined sea stars were the most numerous sea stars present (0.5/m^2).

Fish diversity was high. Juvenile rockfish and surfperch were the most abundant fish. Kelp surfperch were especially abundant. Kelp surfperch, señoritas, and jack mackerel were observed in large mixed groups feeding among the upper kelp stipes, presumably on the kelp mysids and isopods. The garibaldi nest along the transect was active again this year.

Abalone recruitment was apparently low this year. A considerable effort went into invasive sampling, but turned up no juvenile abalone along the transect. There were 49 red abalone in the 15 recruitment modules, 7 were thought to be

natives. Because of growth on the shell, it was very difficult to distinguish between native and hatchery abalone. The sizes of the abalone ranged from 46-145 mm. The bricks within the habitats were becoming very overgrown, mostly by various bryozoans and sponges. A variety of species were found living in the modules including juvenile rockfish, octopus, juvenile sea stars, sea urchins, a variety of crabs, and other small animals.

Johnson's Lee South, Santa Rosa Island

Station # 4, SRIJLSO

1991 sampling dates: 8/6, 8/7, 10/3

1991 status: healthy, open kelp forest.

This site had a healthy kelp forest, fairly open with a moderate amount of understory algae. Adult and juvenile giant kelp plants were widely spaced, and adult plants were large relative to the Johnson's Lee North site. The density of giant kelp was half that of Johnson's Lee North and the percent cover of kelps was only one-third. Bladder chain and acid kelp were uncommon; however, they were common at the shallower Johnson's Lee North. Miscellaneous red algae covered 33% with another 3% cover for sea tongue.

Small sea cucumbers (Cucumaria sp.) and hydroids (Plumularia sp., and Aglaophenia latirostris) were abundant. Together they were the most numerous miscellaneous invertebrates on RPCs with 30% cover. The ornate tube worm reached 11% cover. Other dominants were bryozoans (15%) and orange cup corals (14%).

Red and purple sea urchin densities decreased to 0.48/m^2 and 1.8/m^2 respectively. Sea urchin density also decreased at the Johnson's Lee North site. Red sea urchins were large here with 61% being legal size or larger and having a mean test diameter of 79 mm.

The red gorgonian was abundant, with most individuals being small. Sunflower stars (0.15/m^2) and bat stars (2.3/m^2) were more common here than at Johnson's Lee North.

Fish species were abundant and diverse. The kelp gunnel and kelp pipefish were observed here, one of the later was caught and measured at 482 mm, near record size. Blue rockfish juveniles were abundant in the transects as were blacksmith. Surfperch, especially rainbow surfperch, were common. Kelp surfperch and the giant kelpfish were abundant in the upper layers of the forest.

Rodes Reef, Santa Rosa Island

Station #5 SRIRR

1991 sampling dates: 7/9, 7/10, 10/2

1991 status: Dense kelp forest

A mature kelp forest with a very dense canopy characterized this site in 1991. Because of a dense canopy in July it was quite dark on the bottom and not surprisingly there were few understory algae. This was reflected in low quadrat counts, low percent cover, and low diversity of algal species. Giant kelp counts were down overall, primarily because of a reduction in juvenile plants. Size frequencies were conducted at the east end of the transect where the plants were no older than one year (the site was damaged in 1990). Holdfasts on plants at the west end of the transect were larger and stipe counts were higher.

During the October sampling we noted a reduced kelp canopy. Many of the canopy blades were pale, torn, and overgrown. Presumably this was a result of the warm waters of late summer. Kelp isopods Idotea resecata and kelp curler amphipods were very common in July and October, and may have been

factors in the shabby appearance of the kelp canopy. Mysid swarms near the bottom were common.

Sponges, tunicates, and bryozoans were both diverse and abundant, together occupying 15% of the substrate. Ornate tube worms were abundant this year with a mean cover of 9%. The southern staghorn bryozoan (5%) and miscellaneous invertebrates (12%) (mostly hydroids and worms) covered another 17% of the substrate. These organisms were also abundant in 1990, and may partially account for the low percent cover of crustose coralline algae.

Purple sea urchins were at low densities (1.3/m^2) and generally only found in deep crevices. Red sea urchins were more dense (2.2/m^2), but at their lowest level ever at this site, again mostly in crevices. Small red sea urchins were commonly found near the large adults.

Bat stars were abundant. Adult and juvenile sunflower stars were also abundant (mode size = 32), even though the band transect counts were low. Blood stars Henricia leviuscula and giant-spined sea stars were common as well.

Large male sheephead were common. Juvenile rockfish and

striped surfperch were abundant. Señorita wrasses were common in the canopy, but not near the bottom. There was a high diversity of fish including tubesnouts, various rockfish, surfperch, and kelp bass.

East Point, Santa Rosa Island

We made survey dives right off the point on a series of rocky reefs at 20 ft, alternating with sand channels about 28 ft deep. The reefs had sparse giant kelp with some dense patches of southern palm kelp. Large specimens of the moon sponge Spheciospongia confoederata were abundant, often with bright yellow Doriopsilla albopunctata nudibranchs or several chestnut cowries on them. The aggregated red sea cucumber, Pachythyone rubra, covered most of the reefs. There was a variety of fish including garibaldi, kelp bass, pile surfperch and white surfperch. The bubble snail Haminoea vesicula was found in abundance in one area.

Talcott Shoals, Santa Rosa Island

This was an interesting area with shale rock reefs. There were

areas of very abundant young recruits of giant kelp. California sea palm dominated in some areas. Boring clams (pholads) were very abundant. Yellow-spot fringeheads were seen in some empty holes. Large mats of small tube worms (Phyllochaetopterous prolifica) were common. Large moon sponges Spheciospongia confoederata, numerous whitecap limpets Acmaea mitra, rough key hole limpets Diodora aspera, and the lined chiton Tonicella lineata were some of the species noted. Schools of rainbow surfperch Hypsurus caryii were also noted.

Gull Island, Santa Cruz Island

Station #6 SCIGI

1991 sampling dates: 5/22, 9/16, 9/17, 10/17

1991 status: Dense, young kelp forest.

There was abundant kelp growing along the entire line. Density and percent cover were the highest recorded here since 1983. The north end of the transect which was mostly bare last May, was covered with juvenile kelp in October. The southern palm kelp appeared stressed, possibly from the dense canopy forming above. Many juvenile southern sea palms were growing along the north end of the transect. In October the giant kelp was healthy with dark color and blades in good shape.

Algae, especially crustose coralline, dominated the site at 50% cover. Bryozoans were the dominant encrusting invertebrates. In the miscellaneous invertebrate category, the Christmas tree worm Spirobranchus spinosus was most common along with a small number of hydroids and spirorbid worms. Together, they covered 13% of the substrate. Bare substrate accounted for only 6%.

Red sea urchin density was at its lowest ever, 0.5/m^2, and purple (16.6/m^2) and white (0.55/m^2) sea urchins continued their downward trend of the past several years. However, the surrounding reef areas were dominated by high densities of purple sea urchins. Red sea urchins were small with a mean size of 28 mm. Several juvenile Coronado sea urchins (Centrostephanus coronatus) were found. Bat stars were common at 1.9/m^2. One bat star was seen exhibiting "wasting disease" symptoms.

Three native red, and no hatchery abalone were found inside the modules. The modules were used for size frequencies of sea stars and sea urchins. Various fish, octopus, snails, sea urchins, and sea stars were found inside the modules.

Small colonies of the purple hydrocoral were observed, indicating good recruitment in recent years. We do not know the age of these 1-2 cm tall colonies.

Fish were abundant and diverse. Large sheephead, cabezon, and lingcod were observed. These are important predators on invertebrates. Rock wrasse were not seen at this site.

Fry's Harbor, Santa Cruz Island

Station #7 SCIFH

1991 sampling dates: 7/10, 7/11, 10/1

1991 status: barren, dominated by aggregated red sea cucumbers.

Divers made surveys both around the point and farther into the cove from the ends of the transect. No giant kelp was observed, however southern sea palm juveniles were common in spots down to 50 feet. There was little other macro algae.

This site continues to be dominated by the aggregated red sea cucumber which completely covered the bottom in some places. Although the total cover was only 16% on RPCs, they appeared to cover a larger area. The aggregated red sea cucumber

abundance increased into the harbor and was most abundant at the mid-level depths (20-40 ft).

White sea urchins were abundant everywhere in the cove below 50 feet. White sea urchins were very abundant on the deeper side of the transect, especially on the south end. The mean number of white sea urchins was only 2.2/m^2, reflecting a patchy distribution. Red and purple sea urchin densities were moderate at 1.6 and 4.8/m^2 respectively. Sea urchins were common outside the cove as were giant-keyhole limpets.

The red gorgonian was very abundant on the lower side of the line. The La Jolla cup coral covered 30% of the substrate. The warty sea cucumber was very abundant at nearly 2/m^2. Chestnut cowries were common.

Bat stars were common at 1.4/m^2, its highest level. Large ochre sea stars and giant-spined sea stars were numerous in the shallow subtidal, feeding on mussels. An ochre sea star was observed exhibiting symptoms of wasting disease.

Blue-banded and blackeye gobies were abundant. There was a high diversity of fish with all target species being found except striped surfperch. Blacksmith were very abundant,

especially juveniles which were very abundant in July. We observed four harbor seals driving mackerel into a cave where they were easier for the seals to catch. Several large kelp bass took advantage of the situation to catch mackerel also.

Pelican Bay, Santa Cruz Island

Station #8 SCIPB

1991 sampling dates 7/8, 7/12, 10/1

1991 status: Barrens

The site was barren; however, there was a fair amount of macro algae including a number of giant kelp plants just outside the transect. The kelp appeared to be healthy and acted as an attractant to fish in the area. A few juvenile giant kelp plants were counted in quadrats, and brown algae (mostly Dictyota binghamiae and Acinetospora nicholsoniae) covered 7% of the transect. Miscellaneous red and green algae (mostly filamentous) together occupied nearly 18% of the substrate. Crustose coralline algae covered nearly 35% of the surface. A diatom film, recorded as miscellaneous plants, grew over much of the coralline algae. There was a lot of silt on the bottom, sometimes over 1 cm deep in rock crevices. The deeper areas often appeared anaerobic just below the surface.

Chaetopterous worms were the most common miscellaneous invertebrate on RPCs (19%). Strawberry anemones and La Jolla cup corals were dominant invertebrates. The California cone snail Conus californica and Nuttall's hornmouth snail Ceratostoma nuttalli were observed laying eggs.

Red and purple sea urchins densities were moderate, 2.2/m^2 and 8.7/m^2 respectively. White sea urchins were not detected in band transects, but were present in deeper areas of Pelican Bay. Wavy top snail densities (0.88/m^2) decreased for its fifth consecutive year.

Both blue-banded and blackeye gobies were abundant. Juvenile sheephead and rock wrasse were common. Large rubberlip surfperch and kelp bass were common. Several kinds of rockfish and two lobster were seen on a night dive in July. Only two lobsters were found despite a lot of searching. Several horn shark egg cases were found among the rocks near the site. Fish in general were abundant in October.

Scorpion Anchorage, Santa Cruz Island

Station #9 SCISA

1991 sampling dates: 9/19, 9/20, 10/4

1991 status: Purple sea urchin barrens

This site was still a complete barren in 1991, showing no signs of recovery since last year. There were no macro brown algae around the site. The only macro algae besides crustose coralline algae (49% cover) were some grazed articulate coralline algae and a few small tufts of Laurencia sp..

The Christmas-tree worm, Spirobranchus spinosus, was the most common miscellaneous invertebrate encountered during the RPCs (12%). Barnacles, tube worms, and small anemones were also present, but made up less than 5% of the miscellaneous invertebrates. Crustose coralline algae covered 50% of the substrate while nearly 32% was recorded as bare substrate.

Purple sea urchins (56.4/m^2) dominated the site. Red sea urchins (0.4/m^2) were sparse and spread out among the boulders. White sea urchins were present but uncommon. Wavy turban snails were abundant (1.1/m^2) in a wide range of sizes, though the mean density was only a quarter of the 1988 mean. Among all the sites this was the highest density of turban snails seen this year.

Yellow banks, Santa Cruz Island

Station #10, SCIYB

1991 sampling dates: 5/29, 8/26, 8/27, 10/17

1991 status: Healthy kelp forest

There was a moderate kelp canopy over the transect site, with what might be described as a typical mature forest; large plants spaced far apart. The kelp forest reestablished itself here in 1988. The California sea palm was quite common along the reef. Bladder-chain kelp was common in patches. While still common in comparison to other stations, brown algae, with the exception of acid-weed, was less common this year than last. The macro algae remained healthy through the summer, not exhibiting a decline as seen at some of the other dense kelp forests. Articulated coralline algae covered 20%, while crustose coralline algae dominated 52% of the substrate on RPCs.

Cup corals and bryozoans were dominant encrusting animals at this site. Hydroids, amphipod tube mats, and the worm Pista elongata were dominants within the miscellaneous invertebrate category on RPCs. Small red gorgonians were common indicating that there was recent recruitment. Mysids and isopods were

scarce in the kelp canopy.

Wavy turban snails were common (0.6/m^2) and generally very large (mean size = 98 mm). Kelp snails, Norrisia norrisi were common in the canopy. The chestnut cowries were observed brooding eggs in the abalone recruitment modules in May.

Red and purple sea urchins were moderately abundant (2.2/m^2 and 11.5/m^2 respectively). White sea urchins were patchy and very abundant in some areas (9/m^2 overall). In October there were a large number of fresh white sea urchin tests along the transect. Sea stars were found in only moderate abundance, with the giant-spined sea star being the most common.

Censusing the 20 abalone recruitment modules yielded 21 abalone; 12 hatchery abalone, 2 red abalone of unsure origin, 4 native reds, and 1 pink abalone. The wire cages on the five modules placed by the Channel Islands Council of Divers were recently changed to the plastic coated wire. Size frequencies of sea stars and sea urchins were partially taken from animals in the modules.

Señorita wrasses and blacksmith were very numerous, especially in October. Sheephead were only moderately abundant.

Northwest Prisoner's Harbor, Santa Cruz Island:

The site was primarily large boulders along a slope similar to Fry's Harbor. There was a slight current, but still a lot of silt. There was some kelp and understory algae, primarily on the large boulders, down to 40 feet. Some pink abalone and several sheep crabs Loxorhyncus grandis were found. The aggregated red sea cucumber Pachythyone rubra were common in some areas, but did not dominate the scene as at Fry's. The intertidal was similar to Fry's with large mussels, huge sea stars, and the green algae, Codium fragile, on which we found an abundance of Elysia hedgpethi, a tiny sea hare.

One-half mile east of Potato Harbor, Santa Cruz Island:

A survey dive was made along the north shore of Santa Cruz Island approximately one-half mile east of Potato Harbor. Enormous mussels and sea stars were on the pinnacles in shallow water. The giant green anemone Anthopleura xanthogramica (not commonly seen east of Santa Rosa) was mixed in with the mussels. Purple sea urchins dominated some of the

shallow areas around the granite boulders. Several bat stars were found that appeared to have wasting disease. Juvenile sea stars (unknown species) were common on red sponges.

Admiral's Reef, Anacapa Island

Station #11 ANIAR

1991 sampling Dates: 7/26, 8/8, 9/18, 9/19

1991 status: Mature kelp forest

Admiral's Reef was characterized by a beautiful mature kelp forest with a rich diversity of life. Four species of gorgonians were found in abundance earning the site its popular name of Coral Reef. Large giant kelp plants were widely spaced, and overall, giant kelp density was low at $0.33/m^2$ with juveniles only making up a third of that. The colander weed, Agarum fimbriatum was quite common and was mostly responsible for the 8% cover by miscellaneous brown algae. Red algae was abundant at this site with 25% cover.

Miscellaneous invertebrates dominated by Christmas-tree worms Spirobranchus spinosus, amphipod tube mats, and a few hydroids, covered 21% of the substrate. There was a broad diversity of encrusting invertebrates at this site with no

dramatic changes in 1991.

White sea urchins were present over much of the reef, but as in previous years, were primarily at the east end of the transect. Overall, white sea urchin densities were the lowest since 1986 (4.9/m^2), and were counted on band transects (in previous years, white sea urchins were counted in quadrats because of their high densities). Red and purple sea urchin densities were moderate, 3.2/m^2 and 7.9/m^2 respectively.

Bat stars were the most common of the monitored sea stars at 0.45/$m^{2,}$ though blood stars Henricia leviuscula and comet stars Linkia columbiana were also common. Warty sea cucumbers were abundant at 1.9/m^2.

Large schools of fish were encountered in the mid and upper canopy. Blacksmith and opaleye were the most abundant. Kelp surfperch and halfmoon were also common. Juvenile and adult giant kelpfish were seen. Several tubesnouts were observed. This fish is not usually seen east of Santa Rosa Island.

Hatchery raised red abalone were placed in the recruitment modules 7/25/91. We measured all the abalone in the modules on 8/8/91, measuring 603 abalone in the seven modules. The

bricks were fairly clean, but there were a number of different invertebrates living among the bricks. Tiny (≈1 cm) sunflower stars were found in at least one module. The wire was rusted and had virtually disintegrated around several modules. Several hatchery abalone were observed living on nearby rocks. Empty shells from the area were collected.

Cathedral Cove, Anacapa Island

Station #12, ANICC

1991 sampling dates: 8/8, 8/29, 8/30

1991 status: Young kelp forest

Giant kelp was growing well along the entire transect. Though the density of kelp on quadrats was low (0.53/m^2), the percent cover from random point counts was 20%. Other algae were scattered, mostly along the deeper side of the transect. Various brown algae were dominant, with red algae being scarce. The boulder area on the shallow side of the transect was primarily barren of algae, with the Christmas-tree worm as the dominant encrusting organism. Thirty-five percent of the of the surface was bare.

Red and purple sea urchins densities were 4.1/m^2 and 0.6/m^2

respectively. Red sea urchins were large with a mean size of 81 mm and 66% were greater than the legal size of 76 mm. Except for juvenile bat stars (mean size of 9 mm) found under rocks, sea stars were uncommon. We should see an increase in bat star densities if these young recruits survive. This was one of the highest concentrations of juvenile bat stars we have seen.

Scallops, pink abalone, and lobster were found in abundance at this site. Both juvenile and adult pink abalone were common. Large lobster were seen, and some dens (including one on a band transect) were packed with lobster. Transparent juvenile lobster were observed here and at night at East Fish Camp, on the south side of Anacapa Island. In a 10 m^2 area, 67 lobster molts were found.

Fish were very abundant at this site. Except for striped surfperch all species on the fish transect were present and juveniles of most species were observed. This year large numbers of juvenile sheephead and garibaldi have been seen at Anacapa and Santa Barbara Islands.

Abalone recruitment modules were placed here during the summer by volunteer divers but were not stocked with transplants. No

native abalone were found inside.

Landing Cove, Anacapa Island

Station #13, ANILC

1991 sampling dates: 8/9, 9/30, 10/18

1991 status: Open kelp forest

This site was characterized by an open kelp forest with little canopy. While there were a number of juvenile giant kelp (1.6/m^2), the overall abundance has remained essentially unchanged over the last four years. The understory kelps, southern sea palm (1.8/m^2), and oar weed (4.6/m^2 and 19% cover) were abundant. The California sea palm was abundant in the deeper section of the transect, but the overall mean from quadrats was low (0.13/m^2). Other algae were present, and agar weed was the most abundant for any site with a mean percent cover of 18%. The dominants within the miscellaneous invertebrate category on random contacts were hydroids and Christmas tree worms.

Both red (3.6/m^2) and purple (3/m^2) sea urchin mean counts increased to their highest levels at this site. All size frequency measurements for sea urchins came from the top of

the reef, so they may not reflect the high percentage of large sized red sea urchins further into the cove. The warty sea cucumber density declined to 0.1/m^2, one-tenth the 1989 count. Juvenile warty sea cucumbers and kellet's whelk were found in the cove.

Pink abalone (0.03/m^2) and rock scallops (0.5/m^2) were common. Wavy turban snails were seen only along the deep part of the transect. Most other macro-invertebrates were present in low numbers. No sea stars were counted in any quadrats or band transects, however, this is not unusual. Only three giant-spined sea stars and one juvenile bat star were found during surveys of the entire site. Large octopi were observed.

Fish diversity was high with opaleye and blacksmith being the most abundant. Garibaldi and kelp bass were also common. Blue-banded gobies were seen but not counted in any of the quadrats. Several juvenile garibaldi were seen throughout the cove. The high numbers and diversity of juvenile fish observed in past years were not seen in 1991.

Garbage Cove, Anacapa Island:

We surveyed Garbage Cove where sea urchin divers had illegally harvested 2500 lbs of red sea urchins, then dumped them in one small area after they were apprehended. Large red sea urchins were abundant all along the slope of the north side of the island. We found an area roughly 25 m^2 that was solid red sea urchins, sometimes two or three deep. There were approximately 300-400 empty tests among the pile where fish had eaten the injured sea urchins. Nearby, there was an area about 1600 m^2 that was nearly cleared of red sea urchins.

Southeast Sea Lion, Santa Barbara Island

Station #14 SBISESL

1991 sampling dates: 6/18, 6/19, 8/28

1991 status: sea urchin barrens

This site was still a sea urchin barrens and remained relatively devoid of large macroalgae. A few giant kelp plants were at the south end of the transect, and several small juvenile kelp plants were found, mostly epiphytic on gorgonians. Thirty-six percent of the substrate was bare. Miscellaneous red algae, mostly filamentous species, reached 8% cover. There were some large patches of Codium setchellii/hubsii, which constituted most of the 3% cover by

green algae. Tunicates and the orange puffball sponge were relatively common, as were large gorgonians, especially the red gorgonian.

Red sea urchins were moderately common at 1.6/m^2. This sea urchin's size frequency distribution exhibited its usual strong bimodality. Purple sea urchin density remained high at 52.7/m^2, but has been declining since 1988. White sea urchins were common at 16.3/m^2.

Warty sea cucumbers, bat stars, and Christmas-tree worms were all observed spawning in June. The giant-spined sea star was observed posturing on the tips of its arms, this may be part of its spawning behavior ritual.

Except for señoritas, blacksmith, and sheephead, fish were not abundant. Juvenile sheephead were observed at all Santa Barbara Island sites. At this site, they were counted on fish transects, and entered in the database as females.

Arch Point, Santa Barbara Island

Station #15 SBIAP

1991 sampling dates: 6/17, 6/18, 8/28

1991 status: sea urchin barren/developing kelp forest

There was approximately 2-3% kelp canopy cover over the transect. The percent cover of kelps on RPCs was recorded at 8%. There were adult giant kelp plants along the south end of line and 20 m north of the transect. Most of these adult plants were small, with a mean number of stipes and holdfast diameter measuring 6 and 11 cm respectively. Numerous small kelp plants ($2/m^2$) were growing on bladder chain kelp, and were noted on quadrat counts as being epiphytic. Articulated coralline algae was the highest abundance seen in many years, with a mean cover of 17%. Agar weed was at its greatest abundance here, covering 2.3% of the substrate.

Many tiny purple sea urchins were seen. Red and purple sea urchin densities remain consistently high at $2.3/m^2$ and $59.5/m^2$ respectively. White sea urchins were not detected in band transect counts, but were present in low numbers.

Chestnut cowries were observed brooding eggs. Giant-spined sea stars were observed eating wavy turban snails. Bat stars were present in low numbers and were absent in quadrats for the third year in a row.

On fish transects, blacksmith, señoritas, garibaldi, and opaleye were common. At least three tagged garibaldi were observed. Tagging was done here in 1984. The island kelpfish was abundant at 0.93/m^2, the highest abundance for all sites.

Cat Canyon, Santa Barbara Island

Station #16 SBICC

1991 sampling dates: 6/19, 6/20, 8/28

1991 status: sea urchin barren

Kelp was present between 70 and 80 meters on the transect and there was a dense patch southeast of the east end. The canopy estimate was 10%, while the percent cover from RPCs was 11%. Juvenile giant kelp plants were very abundant within a few quadrats in the forested area. Otherwise, the site was primarily devoid of macroalgae, with 27% bare rock.

Red sea urchins were common with a density of 1.8/m^2. Purple sea urchins were abundant at 37/m^2, but were the lowest density of the three Santa Barbara Island sites. Bat stars were not detected in quadrat counts, but were present in low numbers. Several green and pink abalone, as well as 19 lobster were found on band transects.

Fish diversity was high with all monitored fish species being found except pile surfperch. Blacksmith and señoritas were abundant.

Seven-tenths Reef, Santa Barbara Island:

This reef is northwest of Webster Point. Some red algae, notably Gigartina corymbifera and numerous painted spindle shells Fusinus luteopictus were found here and not at other sites. The green algae Codium setchellii/hubsii was common also. The scorpion fish Scorpaena guttata were numerous, as were the nudibranchs Dirona picta and Hermissenda crassicornis. On survey dives at Signal Peak, pink abalone were found in patches of five to ten. The old transect line was seen.

Table 4. Kelp forest monitoring site status 1991.

<u>San Miguel Island</u>	
Wyckoff Ledge	Mature kelp forest with dense canopy and abundant understory red algae.
Hare Rock	Sea urchin barren, high density of red sea urchins, strawberry anemones.
<u>Santa Rosa Island</u>	
Johnson's Lee North	Dense young kelp forest.
Johnson's Lee South	Mature open kelp forest.
Rodes Reef	Mature kelp forest with dense canopy and few understory algae.
<u>Santa Cruz Island</u>	
Gull Island South	Dense young kelp forest.
Fry's Harbor	Barrens dominated by aggregated red sea cucumbers and white sea urchins at lower depths.
Pelican Bay	Barrens with moderate density of sea urchins and some brown algae.
Scorpion Anchorage	Sea urchin barren with high density of purple sea urchins and low diversity.
Yellowbanks	Mature open kelp forest with a moderate understory and moderate abundance of white sea urchins.
<u>Anacapa Island</u>	
Admiral's Reef	Mature kelp forest with a rich understory and declining population of white sea urchins.
Cathedral Cove	Open kelp forest with sandy rock barrens.
Landing Cove	Young open kelp forest with a diverse assemblage of fish and invertebrates.
<u>Santa Barbara Island</u>	
SE Sea Lion Rookery	Purple sea urchin barren with a moderate number of white sea urchins.
Arch Point	Purple sea urchin barren with a developing kelp forest.
Cat Canyon	Purple sea urchin barren with some remnant and recovering kelp patches.

GENERAL DISCUSSION

Observing the changes in the kelp forests continues to be an exciting challenge. During the last ten years we have witnessed much change in the kelp forests. Physical factors (storm damage) was responsible for the loss of kelp in some areas, while sea urchins were responsible for the kelp decline in others. Barren areas developed and persisted in some locations and others quickly returned to lush kelp forests. What is apparent, is that there is still much to be understood about this system. The kelp forest ecosystem is dynamic both temporally and spatially. Some trends occur between sites that are similar in relation to depth, exposure, prevailing water temperatures, substrate, and other factors that allow us to make generalizations about broader areas; however, each site is unique with its own attributes. Monitoring more sites would give a better idea of the island chain, but we are limited to only having the time to briefly survey different areas and make general comparisons.

We have also seen dramatic changes occur from year to year. Seasonal sampling would provide insight into the dynamics of those changes (eg. timing of recruitment events, effects of storm waves), but again it is not practical for this program

to provide more than a yearly look at each site. Sampling less than yearly would be very costly in the loss of knowledge about the changes, as we have observed complete changes in the ecosystem within one year.

Juvenile sheephead and garibaldi were both commonly seen at Santa Barbara, Anacapa, and some Santa Cruz Island sites. Increases in the number of sightings this year could be a result of increased recruitment or a late spawning, meaning more young fish still present during the monitoring season. Many of these juvenile fish were one year old which goes along with the general observation that last year was a good recruitment year for many fish.

Nine of the sites (SMIWL, SRIJLNO, SRIJLSO, SRIRR, SCIGI, SCIYB, ANIAR, ANICC, ANILC) had healthy kelp forests this year. Two others (SBICC and SBIAP) had some kelp in the transect area, but were still largely purple sea urchin barrens. Kelp was starting to grow around Pelican Bay, and was present near Hare Rock and Southeast Sea Lion Rookery.

Water temperatures were generally a little cooler on average than last summer. However, the sea star wasting disease which is normally associated with warmer water, was observed again

this year at Gull Island, Fry's Harbor, and east of Potato Harbor. Sea star recruitment was seen in several places this year.

In the spring, new abalone recruitment modules were installed at the three Anacapa sites. This was accomplished with a volunteer effort by the Channel Islands Council of Divers. Red abalone from Channel Islands stock at the California Department of Fish and Game, Granite Canyon Lab were transplanted to the Admiral's Reef modules in July as mentioned above. A transplant of red abalone was made to Landing Cove in December. Modules at Yellow Banks, Gull Island and Johnson's Lee North were censused in May/June and again in August/September.

The abalone recruitment modules do seem to be attracting native abalone; however, it is still too soon to determine if we will be able to detect recruitment pulses with them. Overall abalone recruitment in 1991 seemed to be low. The modules have been interesting to watch as various organisms settle on their surfaces. We believe that the modules will be useful to obtain size frequencies of a variety of organisms and recommend this for future sampling. Other measurements (outside the modules) may be needed to obtain larger animals;

however, the modules seem to work quite well for aggregating small animals and should be useful for detecting recruitment in several species including sea stars and sea urchins. Without the modules it is necessary to turn rocks in order to find juveniles of many species. Juvenile sea stars and sea urchins are especially easy to find in the modules. Juvenile keyhole limpets, chestnut cowries, and warty sea cucumbers which we rarely find even turning rocks, have also been found in a variety of sizes in the modules.

We did not observe any symptoms of the withering foot syndrome among subtidal abalone; however, a giant keyhole limpet Megathura crenulata was collected by park divers off West Anacapa Island that was shrunken and moribund. This was the first and only limpet we have seen with symptoms similar to the intertidal black abalone.

We feel that after ten years it is time to review current techniques in general. One of the advantages of using "volunteer" divers from other agencies and universities is that many new ideas and methods are brought to our attention. New techniques may have been developed that we could apply, or modifications could be made in the sampling or statistical analysis that would give a clearer picture of the community.

To learn about the best and most current sampling techniques, we will continue to consult with other agencies doing similar projects and attend appropriate meetings and symposia. We also propose to conduct a workshop or symposium at a conference with others in the field doing similar monitoring. Goals of such a workshop would be to evaluate our methods and determine if our results are adequately meeting the management needs of the park.

A further recommendation is to update the data management programs for ease of data entry and retrieval. Several modifications were made to existing programs this year and new programs were written to keep up with new hardware at the park. All of this improved our ability to generate data summaries for all the project data. A species list data base needs to be developed to manage data on general species. Some work has been done to create the programs and we are working cooperatively with the Channel Islands Research Program (Tatman Foundation) to develop the database.

This year we looked into using NASA high altitude ER-2 photo imagery as a tool for studying the kelp forests and determining the extent of kelp around the islands. While there seems to be some potential in this, we feel that the

cost is high and that lower altitude images may be more useful to our needs. The need to determine kelp forest canopy cover and integrate the kelp bed locations with a Geographic Information System remains.

Other accomplishments for 1991 included replacing the leadline transects at most of the stations and repairing missing transect and photoplot stakes. This year we spent time with writers from the National Geographic Society, and Backpacker Magazine. Project divers assisted California Department of Fish and Game with abalone surveys in Mendocino County and participated in surveys of Santa Catalina Island for the Tatman Foundation's Channel Island Research Program. Data from the Kelp Forest Monitoring project was used by the California Department of Fish and Game in making recommendations for changes in red abalone management. Data was also requested for defense in a court case involving a sea urchin diver, for use in research on trends analysis by a visiting professor at University of California, Santa Barbara, and for studies on surfperch abundance and juvenile fish recruitment at UCSB.

Table 5. 1991 kelp forest monitoring program participant and cruise list.

PARTICIPANTS	AFFILIATION	CRUISES PARTICIPATED
Loanna Addessi	San Diego State Univ.	6
Bill Avery	Channel Islands National Park	1,2,3,4,5,6,7,8,9,10,11
Bob Barber	Volunteer in Park	7
Kristine Barsky	Calif. Dept. of Fish and Game	3,8
Steve Barsky	Marine Marketing & Consulting	3,8
Randy Bidwell	Channel Islands National Park	5
Mark Cederberg	Volunteer in Park	9
Brandon Cole	Univ. Calif. Santa Barbara	5
Dave Compton	Volunteer in Park	5
John Conti	Truth Aquatics	6
Mike Conway	Channel Islands National Park	3,4,5,6,7,8,9,11
Gary Davis	Channel Islands National Park	1,2,3,4
Corky Farley	Channel Island National Park	3
Kate Faulkner	Channel Islands National Park	6
Constance Gramlich	San Diego State Univ.	6
Diane Green	Santa Monica Mountains NRA	8
Peter Haaker	Calif. Dept. of Fish and Game	9
Daniel Heilprin	Moss Landing Marine Lab	10
Akiko Kano	Univ. Calif. Santa Barbara	10
Konstantin Karpov	Calif. Dept. of Fish and Game	6
Hans Kuck	LA Museum of Natural History	11
David Kushner	Channel Islands National Park	3,4,5,6,7,8,9,10,11
Bob Lea	Calif. Dept. of Fish and Game	9
Karen Light	Monterey Bay Aquarium	10
Dave Long	Cabrillo High School, Lompoc	4
Laurence Laurent	San Luis Obispo Co. Supervisor	9
Mike McNulty	Moss Landing Marine Lab	7
Tom Melham	National Geographic Society	5
Carolyn Meyer	Redwood National Park	11
Dave Meyer	Bell Intermediate, Garden Grove	8
Matt Newnhan	Volunteer in Park	5
Tom Niesen	San Francisco State Univ.	7
John Provo	Channel Islands National Park	4,5,6,7,10,11
Carol Reed	Channel Is. Counsel of Divers	3
Paul Reilly	Calif. Dept of Fish and Game	4
Dan Richards	Channel Islands National Park	1,2,3,4,5,6,7,8,9,10,11
Diane Richardson	Channel Islands National Park	4,6,8,9,11

Dr. Robert Rowley	NOAA/Channel Islands NMS	4
Julie Smith	Orange County Marine Institute	9
David Stoltz	Channel Islands National Park	10
Whitney Stoltz	Volunteer in Park	10
Bob Todd	Redwood National Park	10
Heidi Togstad	Calif. Dept. Fish and Game	7
Amy Wagner	EPA/Moss Landing Marine Lab	5
Earl Whetsell	Redwood National Park	10
Dwight Willey	Channel Islands National Park	1,2,3,7

table 5. continued

	Cruise Dates 1991
CRUISE # 1	May 22, 1991
CRUISE # 2	May 29, 1991
CRUISE # 3	June 12, 1991
CRUISE # 4	June 17-21, 1991
CRUISE # 5	July 8-12, 1991
CRUISE # 6	July 22-26, 1991
CRUISE # 7	August 5-9, 1991
CRUISE # 8	August 26-30, 1991
CRUISE # 9	September 16-20, 1991
CRUISE # 10	September 30 - October 4, 1991
CRUISE # 11	October 15-17, 1991

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Appendix A. 1991 Station Data - All Sampling Methods

Introduction

Following are data gathered in 1991 for all kelp forest monitoring program sampling methods. Means, standard deviations and total number of samples (cases) are given for QUADRATS, BAND TRANSECTS, RANDOM POINT CONTACTS, and FISH TRANSECTS. SIZE FREQUENCY data are presented as percentiles falling within indicated size classes. (Readers should be aware that the number of significant digits is an artifact of the database program and does not imply this level of precision.)

Notes on methods:

QUADRATS. Means represent average counts obtained from 20 stratified random 1m X 2m quadrats, each the sum of two individual divers' counts in 1m X 1m quadrats.

BAND TRANSECTS. Means represent average counts obtained from 12 stratified random 3m X 20m transects, each the sum of two individual divers' counts on 3m X 10m quadrats.

RANDOM POINT CONTACTS. Means represent average percent cover for a given organism, or substrate, at 25 stratified random locations along the transect line. Forty points from each quadrat (1,000 points total) are used to determine percent cover of selected organisms and substrate within one meter of the bottom. Percent cover may total more than 100% because of layering.

FISH TRANSECTS. Means represent the average of counts obtained on each pass by divers swimming the entire 100m transect line and observing fishes passing within a 2m X 3m "window" centered on the line. Cases listed refer to the total number of passes made during fish surveys for the year. Adults and juveniles as well as counts for specific transect pass, date, and time are available as raw data. Horizontal sechi measurements were made on each dive. All counts were conducted between 0900 and 1500 hours.

SIZE FREQUENCY MEASUREMENTS. Cases (N) represent the number of organisms measured. Data are presented as percentiles within size classes. Specific dimensions: Tethya- diameter in mm; Hinnites- maximum shell diameter in mm; Haliotis, and Kelletia- maximum shell length in mm; Astraea- maximum diameter of shell at base in mm; Megathura- shell length, not including mantle, in mm; Sea stars- maximum radius in mm; Sea urchins- test diameter in mm; Macrocystis- number of stipes (counted 1 m above the substrate) and maximum holdfast-base diameters in cm. Gorgonians and Allopora- maximum width and height in cm. Raw data will allow correlation between

stipe number and holdfast diameter for individual kelp plants and between width and height for individual gorgonians.

LOCATION 1 SAN MIGUEL ISLAND - WYCKOFF LEDGE

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.6750	0.6935	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0750	0.1832	20
Laminaria farlowii	0.0750	0.2447	20
Macrocystis pyrifera juvenile	0.1500	0.2856	20
Macrocystis pyrifera all	0.8250	0.7122	20
Cypraea spadicea	0.0000	0.0000	20
Astraea undosa	0.0000	0.0000	20
Patiria miniata	1.3500	1.1367	20
Pisaster giganteus	0.1250	0.3582	20
Strongylocentrotus franciscanus	0.6000	1.7592	20
Strongylocentrotus purpuratus	0.1000	0.3479	20
Parastichopus parvimensis	0.1750	0.2936	20
Styela monteryensis	0.0750	0.1832	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.0250	0.1118	20
Alloclinus holderi	0.4500	0.5596	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0917	0.0712	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.2389	0.1882	12
Lophogorgia chilensis	0.0042	0.0104	12
Muricea fruticosa	0.0000	0.0000	12
Muricea californica	0.0000	0.0000	12
Panulirus interruptus	0.0000	0.0000	12
Haliotis rufescens	0.0431	0.0429	12
Haliotis corrugata	0.0000	0.0000	12
Haliotis fulgens	0.0000	0.0000	12
Kelletia kelletii	0.1153	0.1074	12
Megathura crenulata	0.0000	0.0000	12
Hinnites giganteus	0.0014	0.0048	12
Aplysia californica	0.0000	0.0000	12
Pycnopodia helianthoides	0.0486	0.0579	12
Lytechinus anamesus	0.0000	0.0000	12

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.1000	0.5000	25
Miscellaneous brown algae	0.4000	1.1815	25
Desmarestia spp.	1.1000	2.5083	25
Laminaria farlowii	0.1000	0.5000	25
Cystoseira spp.	1.6000	3.5267	25
Macrocystis, Eisenia, Pterygophora	22.6000	14.2427	25
Miscellaneous red algae	61.5000	19.5789	25
Articulated coralline algae	13.6000	11.1589	25
Crustose coralline algae	18.4000	14.3774	25
Gelidium spp.	0.4000	2.0000	25
Gigartina spp.	6.7000	9.3463	25
Miscellaneous plants	0.3000	1.0992	25
Sponges	1.5000	4.0825	25
Corynactis californica	0.3000	1.0992	25
Balanophyllia elegans	3.2000	3.9211	25
Astrangia lajollaensis	0.5000	1.0206	25
Diopatra ornata	14.1000	10.2286	25
Phragmatopoma californica	3.7000	5.2102	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	10.3000	8.8483	25
Diaperoecia californica	0.0000	0.0000	25
Tunicates	1.4000	4.2131	25
Miscellaneous invertebrates	14.7000	11.0236	25
Bare substrate	11.7000	13.5347	25
Rock	73.4000	18.1986	25
Cobble	1.2000	1.9257	25
Sand	25.4000	17.2403	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	4.3681	10.4264	144
Chromis punctipinnis	0.0000	0.0000	12
Oxyjulis californica	5.7500	6.0622	12
Sebastes mystinus	24.4167	19.4817	12
Sebastes serranoides	17.5833	14.4629	12
Sebastes atrovirens	0.8333	1.1146	12
Paralabrax clathratus	0.6667	1.6143	12
Semicossyphus pulcher	1.1667	1.0299	12
Embiotoca jacksoni	1.1667	1.8505	12
Embiotoca lateralis	0.5000	0.7977	12
Damalichthys vacca	0.3333	0.4924	12
Hypsypops rubicundus	0.0000	0.0000	12
Girella nigricans	0.0000	0.0000	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		0.0000	0.0000	12
	910723	0.0000	0.0000	8
	911016	0.0000	0.0000	4
Chromis punctipinnis juvenile		0.0000	0.0000	12
	910723	0.0000	0.0000	8
	911016	0.0000	0.0000	4
Oxyjulis californica adult		2.3333	3.7739	12
	910723	0.7500	2.1213	8
	911016	5.5000	4.6547	4
Oxyjulis californica juvenile		3.4167	6.3168	12
	910723	5.1250	7.2592	8
	911016	0.0000	0.0000	4
Sebastes mystinus adult		0.2500	0.4523	12
	910723	0.2500	0.4629	8
	911016	0.2500	0.5000	4
Sebastes mystinus juvenile		24.1667	19.4368	12
	910723	33.6250	15.6656	8
	911016	5.2500	9.8446	4
Sebastes serranoides adult		0.3333	0.4924	12
	910723	0.3750	0.5175	8
	911016	0.2500	0.5000	4

Sebastes serranoides juvenile		17.2500	14.3027
12	910723	23.8750	12.9993
8	911016	4.0000	2.1602
4			
Sebastes atrovirens adult		0.5833	0.9003
12	910723	0.7500	1.0351
8	911016	0.2500	0.5000
4			
Sebastes atrovirens juvenile		0.2500	0.8660
12	910723	0.3750	1.0607
8	911016	0.0000	0.0000
4			
Paralabrax clathratus adult		0.0000	0.0000
12	910723	0.0000	0.0000
8	911016	0.0000	0.0000
4			
Paralabrax clathratus juvenile		0.6667	1.6143
12	910723	1.0000	1.9272
8	911016	0.0000	0.0000
4			
Semicossyphus pulcher male		0.5000	0.5222
12	910723	0.5000	0.5345
8	911016	0.5000	0.5774
4			
Semicossyphus pulcher female		0.6667	0.9847
12	910723	0.3750	0.5175
8	911016	1.2500	1.5000
4			
Embiotoca jacksoni adult		1.0000	1.4142
12	910723	0.7500	1.4880

8			
	911016	1.5000	1.2910
4			
Embiotoca jacksoni juvenile		0.1667	0.5774
12			
	910723	0.2500	0.7071
8			
	911016	0.0000	0.0000
4			
Embiotoca lateralis adult		0.5000	0.7977
12			
	910723	0.6250	0.9161
8			
	911016	0.2500	0.5000
4			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			
Damalichthys vacca adult		0.3333	0.4924
12			
	910723	0.3750	0.5175
8			
	911016	0.2500	0.5000
4			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			
Hypsypops rubicundus adult		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			

Girella nigricans adult		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			
Girella nigricans juvenile		0.0000	0.0000
12			
	910723	0.0000	0.0000
8			
	911016	0.0000	0.0000
4			

1991 SIZE FREQUENCY DISTRIBUTIONS

Strongylocentrotus franciscanus

(cases) N=	74
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	2.7%
30 - 34	2.7%
35 - 39	1.4%
40 - 44	4.1%
45 - 49	4.1%
50 - 54	1.4%
55 - 59	1.4%
60 - 64	10.8%
65 - 69	5.4%
70 - 74	10.8%
75 - 79	9.5%
80 - 84	10.8%
85 - 90	17.6%
90 - 94	9.5%
95 - 99	4.1%
100 - 104	0.0
105 - 109	2.7%
> 109	1.4%
min size (mm)	25
max size (mm)	112
mean	74
mode	84

Strongylocentrotus purpuratus

(cases) N=	10
< 5	0.0
5 - 9	0.0
10 - 14	10.0%
15 - 19	20.0%
20 - 24	20.0%
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	10.0%
45 - 49	10.0%
50 - 54	10.0%
55 - 59	20.0%
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	14
max size (mm)	57
mean	35
mode	57

Haliotis rufescens

(cases) N=	56
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	1.8%
50 - 54	1.8%
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	1.8%
80 - 84	0.0
85 - 90	1.8%
90 - 94	0.0
95 - 99	0.0
100 - 104	3.6%
105 - 109	1.8%
110 - 114	1.8%
115 - 119	0.0
120 - 124	0.0
125 - 129	3.6%
130 - 134	3.6%
135 - 139	1.8%
140 - 144	8.9%
145 - 149	3.6%
150 - 154	3.6%
155 - 159	1.8%
160 - 164	3.6%
165 - 169	5.4%
170 - 174	12.5%
175 - 179	8.9%
180 - 184	10.7%
185 - 189	0.0
190 - 194	1.8%
195 - 199	5.4%
> 199	8.9%
min size (mm)	47
max size (mm)	225
mean	158
mode	140

Kelletia kelletii

(cases) N=	51
< 40	0.0
40 - 49	2.0%
50 - 59	2.0%
60 - 69	9.8%
70 - 79	7.8%
80 - 89	19.6%
90 - 99	25.5%
100 - 109	27.5%
110 - 119	3.9%
120 - 129	0.0
130 - 139	2.0%
140 - 149	0.0
> 149	0.0
min size (mm)	46
max size (mm)	135
mean	90
mode	102

Astraea gibberosa

(cases) N=	37
< 10	0.0
10 - 19	2.7%
20 - 29	5.4%
30 - 39	0.0
40 - 49	10.8%
50 - 59	54.1%
60 - 69	27.0%
70 - 79	0.0
80 - 89	0.0
90 - 99	0.0
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	14
max size (mm)	67
mean	53
mode	52

Patiria miniata

(cases) N=	50
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	6.0%
50 - 59	24.0%
60 - 69	48.0%
70 - 79	22.0%
80 - 89	0.0
90 - 99	0.0
> 99	0.0
min size (mm)	46
max size (mm)	79
mean	63
mode	58

Pisaster giganteus

(cases) N=	51
< 20	0.0
20 - 39	2.0%
40 - 59	39.2%
60 - 79	27.5%
80 - 99	19.6%
100 - 119	9.8%
120 - 139	0.0
140 - 159	0.0
160 - 179	2.0%
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	36
max size (mm)	174
mean	71
mode	57

Pycnopodia helianthoides

(cases) N=	11
< 20	0.0
20 - 39	0.0
40 - 59	36.4%
60 - 79	18.2%
80 - 99	18.2%
100 - 119	0.0
120 - 139	9.1%
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	18.2%
280 - 299	0.0
> 299	0.0
min size (mm)	45
max size (mm)	278
mean	109
mode	45

Tethya aurantia

(cases) N=	28
< 10	0.0
10 - 19	0.0
20 - 29	3.6%
30 - 39	3.6%
40 - 49	10.7%
50 - 59	7.1%
60 - 69	21.4%
70 - 79	14.3%
80 - 89	7.1%
90 - 99	21.4%
> 99	10.7%
min size (mm)	25
max size (mm)	112
mean	73
mode	63

Macrocystis pyrifera numbers of stipes.

(cases) N=	50
< 3	10.0%
3 - 5	10.0%
6 - 8	14.0%
9 - 11	16.0%
12 - 14	8.0%
15 - 17	6.0%
18 - 20	10.0%
21 - 23	4.0%
24 - 26	6.0%
27 - 29	6.0%
30 - 32	6.0%
33 - 35	0.0
36 - 38	0.0
39 - 41	0.0
42 - 44	2.0%
>44	2.0%
min number	2
max number	49
mean	15
mode	2

Macrocystis pyrifera holdfast diameters

(cases) N=	50
< 6	2.0%
6 - 11	10.0%
12 - 17	22.0%
18 - 23	26.0%
24 - 29	10.0%
30 - 35	12.0%
36 - 41	12.0%
42 - 47	2.0%
48 - 53	2.0%
54 - 59	2.0%
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	5
max width (cm)	55
mean	24
mode	21

LOCATION 2 SAN MIGUEL ISLAND - HARE ROCK 12

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0000	0.0000	20
Macrocystis pyrifera juvenile	0.0000	0.0000	20
Macrocystis pyrifera all	0.0000	0.0000	20
Cypraea spadicea	0.2500	0.4136	20
Astraea undosa	0.0000	0.0000	20
Patiria miniata	2.0500	1.6694	20
Pisaster giganteus	1.0500	1.1344	20
Strongylocentrotus franciscanus	11.2000	4.3661	20
Strongylocentrotus purpuratus	2.3000	2.8580	20
Parastichopus parvimensis	0.2250	0.3432	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.3500	0.3663	20
Alloclinus holderi	0.4500	0.5104	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0278	0.0365	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0375	0.0450	12
Lophogorgia chilensis	0.0000	0.0000	12
Muricea fruticosa	0.0000	0.0000	

12	Muricea californica	0.0000	0.0000
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0000	0.0000
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0000	0.0000
12	Megathura crenulata	0.0000	0.0000
12	Hinnites giganteus	0.0028	0.0065
12	Aplysia californica	0.0083	0.0112
12	Pycnopodia helianthoides	0.0792	0.0450
12	Lytechinus anamesus	0.0000	0.0000

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	2.1000	2.2454	25
Miscellaneous brown algae	0.3000	1.0992	25
Desmarestia spp.	1.6000	8.0000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	0.0000	0.0000	25
Macrocystis, Eisenia, Pterygophora	0.0000	0.0000	25
Miscellaneous red algae	7.7000	7.2140	25
Articulated coralline algae	0.0000	0.0000	25
Crustose coralline algae	53.9000	16.4583	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	8.7000	5.8238	25
Sponges	0.4000	2.0000	25
Corynactis californica	18.0000	14.1421	25
Balanophyllia elegans	2.5000	2.5000	25
Astrangia lajollaensis	3.1000	3.9051	25
Diopatra ornata	0.0000	0.0000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	0.7000	1.5343	25
Diaperoecia californica	0.5000	1.4434	25
Tunicates	0.0000	0.0000	25
Miscellaneous invertebrates	7.9000	7.3485	25
Bare substrate	13.1000	10.8080	25

	Rock	86.5000	17.1543
25			
	Cobble	10.4000	14.4280
25			
	Sand	3.1000	4.2254
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	9.4583	20.4131
96			
	Chromis punctipinnis	26.1250	15.6519
8			
	Oxyjulis californica	8.6250	10.3914
8			
	Sebastes mystinus	64.5000	28.4103
8			
	Sebastes serranoides	6.0000	5.2099
8			
	Sebastes atrovirens	1.3750	1.4079
8			
	Paralabrax clathratus	0.0000	0.0000
8			
	Semicossyphus pulcher	1.8750	1.4577
8			
	Embiotoca jacksoni	1.8750	1.6421
8			
	Embiotoca lateralis	2.2500	2.7646
8			
	Damalichthys vacca	0.8750	1.6421
8			
	Hypsypops rubicundus	0.0000	0.0000
8			
	Girella nigricans	0.0000	0.0000
8			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		13.5000	10.4060	8
	910724	12.2500	13.1751	4
	911016	14.7500	8.6554	4
Chromis punctipinnis juvenile		12.6250	13.7315	8
	910724	1.2500	2.5000	4
	911016	24.0000	9.4163	4
Oxyjulis californica adult		7.7500	10.8332	8
	910724	13.7500	12.8679	4
	911016	1.7500	3.5000	4
Oxyjulis californica juvenile		0.8750	2.4749	8
	910724	0.0000	0.0000	4
	911016	1.7500	3.5000	4
Sebastes mystinus adult		4.1250	4.3239	8
	910724	8.0000	1.8257	4
	911016	0.2500	0.5000	4
Sebastes mystinus juvenile		60.3750	24.9739	8
	910724	80.7500	17.8022	4
	911016	40.0000	5.5976	4
Sebastes serranoides adult		0.7500	0.8864	8
	910724	0.7500	0.9574	4
	911016	0.7500	0.9574	4

Sebastes serranoides juvenile		5.2500	5.0920
8			
	910724	10.0000	0.0000
4			
	911016	0.5000	0.5774
4			
Sebastes atrovirens adult		1.3750	1.4079
8			
	910724	1.0000	1.4142
4			
	911016	1.7500	1.5000
4			
Sebastes atrovirens juvenile		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Paralabrax clathratus adult		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Paralabrax clathratus juvenile		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Semicossyphus pulcher male		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Semicossyphus pulcher female		1.8750	1.4577
8			
	910724	1.2500	0.9574
4			
	911016	2.5000	1.7321
4			
Embiotoca jacksoni adult		1.0000	1.1952
8			
	910724	0.7500	0.9574
4			

	911016	1.2500	1.5000
4			
Embiotoca jacksoni juvenile		0.8750	1.3562
8			
	910724	0.0000	0.0000
4			
	911016	1.7500	1.5000
4			
Embiotoca lateralis adult		1.2500	1.5811
8			
	910724	2.5000	1.2910
4			
	911016	0.0000	0.0000
4			
Embiotoca lateralis juvenile		1.0000	1.3093
8			
	910724	2.0000	1.1547
4			
	911016	0.0000	0.0000
4			
Damalichthys vacca adult		0.8750	1.6421
8			
	910724	1.7500	2.0616
4			
	911016	0.0000	0.0000
4			
Damalichthys vacca juvenile		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Hypsypops rubicundus adult		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Hypsypops rubicundus juvenile		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Girella nigricans adult		0.0000	0.0000

LOCATION 2 SAN MIGUEL ISLAND - HARE ROCK 19

8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			
Girella nigricans juvenile		0.0000	0.0000
8			
	910724	0.0000	0.0000
4			
	911016	0.0000	0.0000
4			

1991 SIZE FREQUENCY DISTRIBUTIONS

Patiria miniata

(cases) N=	68
< 10	2.9%
10 - 19	7.4%
20 - 29	1.5%
30 - 39	2.9%
40 - 49	10.3%
50 - 59	30.9%
60 - 69	29.4%
70 - 79	13.2%
80 - 89	1.5%
90 - 99	0.0
> 99	0.0
min size (mm)	8
max size (mm)	81
mean	54
mode	55

Tethya aurantia

(cases) N=	40
< 10	0.0
10 - 19	0.0
20 - 29	5.0%
30 - 39	12.5%
40 - 49	5.0%
50 - 59	22.5%
60 - 69	25.0%
70 - 79	17.5%
80 - 89	12.5%
90 - 99	0.0
> 99	0.0
min size (mm)	25
max size (mm)	88
mean	59
mode	60

Pisaster giganteus

(cases) N=	67
< 20	0.0
20 - 39	3.0%
40 - 59	10.4%
60 - 79	28.4%
80 - 99	29.9%
100 - 119	19.4%
120 - 139	9.0%
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	30
max size (mm)	136
mean	86
mode	69

Pycnopodia helianthoides

(cases) N=	65
< 20	0.0
20 - 39	7.7%
40 - 59	3.1%
60 - 79	1.5%
80 - 99	9.2%
100 - 119	13.8%
120 - 139	13.8%
140 - 159	6.2%
160 - 179	15.4%
180 - 199	10.8%
200 - 219	1.5%
220 - 239	1.5%
240 - 259	4.6%
260 - 279	6.2%
280 - 299	1.5%
> 299	3.1%
min size (mm)	20
max size (mm)	320
mean	150
mode	104

Strongylocentrotus franciscanus

(cases) N=	100
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	1.0%
25 - 29	0.0
30 - 34	4.0%
35 - 39	8.0%
40 - 44	9.0%
45 - 49	5.0%
50 - 54	9.0%
55 - 59	11.0%
60 - 64	18.0%
65 - 69	10.0%
70 - 74	15.0%
75 - 79	7.0%
80 - 84	2.0%
85 - 90	0.0
90 - 94	1.0%
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	24
max size (mm)	90
mean	58
mode	70

Strongylocentrotus purpuratus

(cases) N=	101
< 5	0.0
5 - 9	2.0%
10 - 14	6.9%
15 - 19	10.9%
20 - 24	13.9%
25 - 29	20.8%
30 - 34	12.9%
35 - 39	16.8%
40 - 44	12.9%
45 - 49	3.0%
> 49	0.0
min size (mm)	6
max size (mm)	49
mean	28
mode	42

Haliotis rufescens

(cases) N=	21
< 25	52.4%
25 - 29	4.8%
30 - 34	14.3%
35 - 39	9.5%
40 - 44	9.5%
45 - 49	4.8%
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
110 - 114	0.0
115 - 119	0.0
120 - 124	0.0
125 - 129	0.0
130 - 134	0.0
135 - 139	0.0
140 - 144	0.0
145 - 149	0.0
150 - 154	0.0
155 - 159	0.0
160 - 164	4.8%
165 - 169	0.0
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	10
max size (mm)	164
mean	33
mode	21

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	1.1000	0.9947	20
Eisenia arborea	0.1250	0.2221	20
Pterygophora californica	0.2500	0.3804	20
Laminaria farlowii	0.4250	0.4667	20
Macrocystis pyrifera juvenile	3.4000	5.5621	20
Macrocystis pyrifera all	4.5000	5.6008	20
Cypraea spadicea	0.3000	0.4974	20
Astraea undosa	0.0250	0.1118	20
Patiria miniata	0.3750	0.4552	20
Pisaster giganteus	0.5000	0.7434	20
Strongylocentrotus franciscanus	0.4500	1.2660	20
Strongylocentrotus purpuratus	0.2500	0.6589	20
Parastichopus parvimensis	0.4750	0.7159	20
Styela monteryensis	1.4750	1.0572	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.0000	0.0000	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0278	0.0304	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0028	0.0065	12
Lophogorgia chilensis	0.0042	0.0104	12
Muricea fruticosa	0.0000	0.0000	12
Muricea californica	0.0000	0.0000	12
Panulirus interruptus	0.0000	0.0000	12
Haliotis rufescens	0.0083	0.0289	12
Haliotis corrugata	0.0000	0.0000	12
Haliotis fulgens	0.0000	0.0000	12
Kelletia kelletii	0.0056	0.0148	12
Megathura crenulata	0.0083	0.0112	12
Hinnites giganteus	0.0250	0.0251	12
Aplysia californica	0.0000	0.0000	12
Pycnopodia helianthoides	0.0583	0.0386	12
Lytechinus anamesus	0.0000	0.0000	12

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.1000	0.5000	25
Miscellaneous brown algae	0.5000	1.0206	25
Desmarestia spp.	12.2000	15.7507	25
Laminaria farlowii	0.2000	0.6922	25
Cystoseira spp.	10.3000	19.5032	25
Macrocystis, Eisenia, Pterygophora	67.3000	20.8407	25
Miscellaneous red algae	34.2000	13.3409	25
Articulated coralline algae	8.6000	6.5383	25
Crustose coralline algae	8.6000	6.6175	25
Gelidium spp.	0.2000	0.6922	25
Gigartina spp.	3.8000	7.3286	25
Miscellaneous plants	0.5000	1.0206	25
Sponges	4.5000	4.5644	25
Corynactis californica	2.6000	4.6480	25
Balanophyllia elegans	5.4000	3.5853	25
Astrangia lajollaensis	1.4000	2.0514	25
Diopatra ornata	0.7000	1.5343	25
Phragmatopoma californica	5.7000	5.4734	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	23.9000	8.1993	25
Diaperoecia californica	1.0000	2.2822	25
Tunicates	19.1000	9.0104	25
Miscellaneous invertebrates	21.7000	8.1240	25
Bare substrate	5.4000	6.5622	25
Rock	95.5000	6.0810	25
Cobble	1.7000	3.2048	25
Sand	2.8000	4.6391	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	2.0278	4.1137	144
Chromis punctipinnis	0.6667	1.3707	12
Oxyjulis californica	6.1667	9.7964	12
Sebastes mystinus	2.5833	5.3845	12
Sebastes serranoides	0.5833	1.4434	12
Sebastes atrovirens	1.0000	1.2792	12
Paralabrax clathratus	0.0833	0.2887	12
Semicossyphus pulcher	0.9167	0.9962	12
Embiotoca jacksoni	6.5000	3.0896	12
Embiotoca lateralis	4.5833	3.1754	12
Damalichthys vacca	0.5833	0.7930	12
Hypsypops rubicundus	0.6667	0.6513	12
Girella nigricans	0.0000	0.0000	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		0.6667	1.3707	12
	910806	0.0000	0.0000	4
	911003	1.0000	1.6036	8
Chromis punctipinnis juvenile		0.0000	0.0000	12
	910806	0.0000	0.0000	4
	911003	0.0000	0.0000	8
Oxyjulis californica adult		3.4167	4.7186	12
	910806	5.0000	8.0416	4
	911003	2.6250	2.2638	8
Oxyjulis californica juvenile		2.7500	8.6036	12
	910806	0.7500	0.9574	4
	911003	3.7500	10.6066	8
Sebastes mystinus adult		0.0000	0.0000	12
	910806	0.0000	0.0000	4
	911003	0.0000	0.0000	8
Sebastes mystinus juvenile		2.5833	5.3845	12
	910806	7.7500	7.2744	4
	911003	0.0000	0.0000	8
Sebastes serranoides adult		0.0000	0.0000	12
	910806	0.0000	0.0000	4
	911003	0.0000	0.0000	8

Sebastes serranoides juvenile		0.5833	1.4434
12			
	910806	0.5000	0.5774
4			
	911003	0.6250	1.7678
8			
Sebastes atrovirens adult		1.0000	1.2792
12			
	910806	1.5000	1.0000
4			
	911003	0.7500	1.3887
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910806	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			
Paralabrax clathratus adult		0.0000	0.0000
12			
	910806	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			
Paralabrax clathratus juvenile		0.0833	0.2887
12			
	910806	0.2500	0.5000
4			
	911003	0.0000	0.0000
8			
Semicossyphus pulcher male		0.0833	0.2887
12			
	910806	0.0000	0.0000
4			
	911003	0.1250	0.3536
8			
Semicossyphus pulcher female		0.8333	0.8348
12			
	910806	0.7500	0.9574
4			
	911003	0.8750	0.8345
8			
Embiotoca jacksoni adult		3.8333	2.4433
12			
	910806	1.7500	0.5000
4			

	911003	4.8750	2.3566
8			
Embiotoca jacksoni juvenile		2.6667	2.9025
12			
	910806	3.5000	3.3166
4			
	911003	2.2500	2.8158
8			
Embiotoca lateralis adult		3.6667	3.4728
12			
	910806	4.0000	5.3541
4			
	911003	3.5000	2.5635
8			
Embiotoca lateralis juvenile		0.9167	1.3114
12			
	910806	0.2500	0.5000
4			
	911003	1.2500	1.4880
8			
Damalichthys vacca adult		0.5000	0.6742
12			
	910806	1.0000	0.8165
4			
	911003	0.2500	0.4629
8			
Damalichthys vacca juvenile		0.0833	0.2887
12			
	910806	0.0000	0.0000
4			
	911003	0.1250	0.3536
8			
Hypsypops rubicundus adult		0.6667	0.6513
12			
	910806	1.0000	0.0000
4			
	911003	0.5000	0.7559
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910806	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			
Girella nigricans adult		0.0000	0.0000

LOCATION 3 SANTA ROSA ISLAND - JOHNSON'S LEE NORTH
12
910806 0.0000 0.0000
4
911003 0.0000 0.0000
8

Girella nigricans juvenile 0.0000 0.0000
12
910806 0.0000 0.0000
4
911003 0.0000 0.0000
8

LOCATION 3 SANTA ROSA ISLAND - JOHNSON'S LEE NORTH

1991 SIZE FREQUENCY DISTRIBUTIONS

Strongylocentrotus purpuratus

(cases) N=	50
< 5	0.0
5 - 9	0.0
10 - 14	2.0%
15 - 19	2.0%
20 - 24	10.0%
25 - 29	6.0%
30 - 34	4.0%
35 - 39	6.0%
40 - 44	18.0%
45 - 49	16.0%
50 - 54	24.0%
55 - 59	4.0%
60 - 64	4.0%
65 - 69	4.0%
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	14
max size (mm)	65
mean	43
mode	44

Strongylocentrotus franciscanus

(cases) N=	114
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	.9%
25 - 29	0.0
30 - 34	.9%
35 - 39	0.0
40 - 44	0.0
45 - 49	.9%
50 - 54	.9%
55 - 59	0.0
60 - 64	.9%
65 - 69	6.1%
70 - 74	7.9%
75 - 79	8.8%
80 - 84	9.6%
85 - 90	21.1%
90 - 94	12.3%
95 - 99	8.8%
100 - 104	7.9%
105 - 109	4.4%
> 109	7.0%
min size (mm)	20
max size (mm)	125
mean	87
mode	86

Haliotis rufescens

(cases) N=	7
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	14.3%
90 - 94	28.6%
95 - 99	0.0
100 - 104	14.3%
105 - 109	0.0
110 - 114	0.0
115 - 119	0.0
120 - 124	14.3%
125 - 129	0.0
130 - 134	0.0
135 - 139	14.3%
140 - 144	0.0
145 - 149	0.0
150 - 154	0.0
155 - 159	0.0
160 - 164	0.0
165 - 169	0.0
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	14.3%
195 - 199	0.0
> 199	0.0
min size (mm)	88
max size (mm)	190
mean	117
mode	88

LOCATION 3 SANTA ROSA ISLAND - JOHNSON'S LEE NORTH

Megathura crenulata

(cases) N=	32
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	0.0
60 - 69	3.1%
70 - 79	6.3%
80 - 89	21.9%
90 - 99	34.4%
100 - 109	21.9%
110 - 119	9.4%
> 119	3.1%
min size (mm)	60
max size (mm)	137
mean	95
mode	100

Hinnites giganteus

(cases) N=	29
< 10	0.0
10 - 19	6.9%
20 - 29	3.4%
30 - 39	13.8%
40 - 49	17.2%
50 - 59	0.0
60 - 69	17.2%
70 - 79	6.9%
80 - 89	6.9%
90 - 99	3.4%
100 - 109	6.9%
110 - 119	3.4%
120 - 129	13.8%
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	10
max size (mm)	126
mean	67
mode	46

Patiria miniata

(cases) N=	48
< 10	0.0
10 - 19	0.0
20 - 29	4.2%
30 - 39	0.0
40 - 49	2.1%
50 - 59	12.5%
60 - 69	35.4%
70 - 79	33.3%
80 - 89	12.5%
90 - 99	0.0
> 99	0.0
min size (mm)	20
max size (mm)	89
mean	67
mode	65

Pisaster giganteus

(cases) N=	64
< 20	0.0
20 - 39	21.9%
40 - 59	15.6%
60 - 79	34.4%
80 - 99	14.1%
100 - 119	7.8%
120 - 139	4.7%
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	1.6%
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	24
max size (mm)	207
mean	69
mode	65

LOCATION 3 SANTA ROSA ISLAND - JOHNSON'S LEE NORTH

Pycnopodia helianthoides

(cases) N=	35
< 20	0.0
20 - 39	0.0
40 - 59	5.7%
60 - 79	28.6%
80 - 99	25.7%
100 - 119	14.3%
120 - 139	8.6%
140 - 159	0.0
160 - 179	5.7%
180 - 199	2.9%
200 - 219	8.6%
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	40
max size (mm)	215
mean	105
mode	70

Tethya aurantia

(cases) N=	24
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	12.5%
40 - 49	8.3%
50 - 59	8.3%
60 - 69	12.5%
70 - 79	4.2%
80 - 89	16.7%
90 - 99	29.2%
> 99	8.3%
min size (mm)	35
max size (mm)	109
mean	74
mode	90

Macrocystis pyrifera numbers of stipes.

(cases) N=	107
< 3	26.2%
3 - 5	23.4%
6 -8	25.2%
9 -11	7.5%
12 - 14	9.3%
15 - 17	4.7%
18 - 20	2.8%
21 - 23	.9%
24 - 26	0.0
27 - 29	0.0
30 - 32	0.0
33 - 35	0.0
36 - 38	0.0
39 - 41	0.0
42 - 44	0.0
>44	0.0
min number	1
max number	22
mean	7
mode	2

Macrocystis pyrifera holdfast diameters.

(cases) N=	107
< 6	.9%
6 - 11	20.6%
12 - 17	15.9%
18 - 23	17.8%
24 - 29	15.0%
30 - 35	4.7%
36 - 41	13.1%
42 - 47	9.3%
48 - 53	2.8%
54 - 59	0.0
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	5
max width (cm)	53
mean	23
mode	18

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.2250	0.4128	20
Eisenia arborea	0.0250	0.1118	20
Pterygophora californica	0.2250	0.3796	20
Laminaria farlowii	0.5000	0.8584	20
Macrocystis pyrifera juvenile	2.1500	2.5189	20
Macrocystis pyrifera all	2.3750	2.5797	20
Cypraea spadicea	0.2000	0.4702	20
Astraea undosa	0.0250	0.1118	20
Patiria miniata	2.3000	1.4815	20
Pisaster giganteus	0.1500	0.3663	20
Strongylocentrotus franciscanus	0.4750	0.9244	20
Strongylocentrotus purpuratus	1.7500	2.0995	20
Parastichopus parvimensis	0.1250	0.2751	20
Styela monteryensis	0.2750	0.4435	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.3000	0.4104	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0875	0.0427	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0722	0.0547	12
Lophogorgia chilensis	0.1833	0.0969	12

Muricea fruticosa	0.0014	0.0048	12
Muricea californica	0.0000	0.0000	12
Panulirus interruptus	0.0000	0.0000	12
Haliotis rufescens	0.0125	0.0311	12
Haliotis corrugata	0.0000	0.0000	12
Haliotis fulgens	0.0000	0.0000	12
Kelletia kelletii	0.0014	0.0048	12
Megathura crenulata	0.0042	0.0075	12
Hinnites giganteus	0.0417	0.0405	12
Aplysia californica	0.0000	0.0000	12
Pycnopodia helianthoides	0.1528	0.0849	12
Lytechinus anamesus	0.0000	0.0000	12

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.7000	2.1065	25
Miscellaneous brown algae	0.3000	0.8292	25
Desmarestia spp.	1.2000	2.7119	25
Laminaria farlowii	1.4000	2.8025	25
Cystoseira spp.	1.1000	2.2913	25
Macrocystis, Eisenia, Pterygophora	23.7000	19.4738	25
Miscellaneous red algae	32.5000	13.3268	25
Articulated coralline algae	6.8000	6.0605	25
Crustose coralline algae	16.1000	13.5416	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	3.1000	5.3658	25
Miscellaneous plants	0.1000	0.5000	25
Sponges	2.0000	3.2275	25
Corynactis californica	4.8000	6.8814	25
Balanophyllia elegans	13.5000	12.6037	25
Astrangia lajollaensis	1.4000	2.5083	25
Diopatra ornata	10.8000	10.9144	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.1000	0.5000	25
Bryozoans, other	15.1000	13.9097	25
Diaperoecia californica	1.3000	2.1794	25
Tunicates	4.0000	4.0182	25
Miscellaneous invertebrates	29.5000	12.3111	25
Bare substrate	7.3000	5.8595	25

Rock	74.2000	19.9964	25
Cobble	2.2000	3.9078	25
Sand	22.3000	18.0410	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	2.6111	5.0412	144
Chromis punctipinnis	8.0833	4.8328	12
Oxyjulis californica	4.0000	3.4641	12
Sebastes mystinus	8.7500	13.2399	12
Sebastes serranoides	0.8333	0.7177	12
Sebastes atrovirens	0.7500	0.9653	12
Paralabrax clathratus	0.1667	0.3892	12
Semicossyphus pulcher	1.9167	2.1088	12
Embiotoca jacksoni	2.9167	1.5050	12
Embiotoca lateralis	2.2500	1.8647	12
Damalichthys vacca	1.5833	1.3790	12
Hypsypops rubicundus	0.0000	0.0000	12
Girella nigricans	0.0833	0.2887	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis	adult	8.0000	4.8617	12
	910807	9.5000	4.7258	4
	911003	7.2500	5.0639	8
Chromis punctipinnis	juvenile	0.0833	0.2887	12
	910807	0.2500	0.5000	4
	911003	0.0000	0.0000	8
Oxyjulis californica	adult	3.6667	2.6054	12
	910807	3.7500	3.5940	4
	911003	3.6250	2.2638	8
Oxyjulis californica	juvenile	0.3333	1.1547	12
	910807	1.0000	2.0000	4
	911003	0.0000	0.0000	8
Sebastes mystinus	adult	0.9167	1.6765	12
	910807	2.2500	2.5000	4
	911003	0.2500	0.4629	8
Sebastes mystinus	juvenile	7.8333	11.7615	12
	910807	21.5000	11.4455	4
	911003	1.0000	1.0690	8
Sebastes serranoides	adult	0.4167	0.7930	12
	910807	1.2500	0.9574	4
	911003	0.0000	0.0000	8

Sebastes serranoides juvenile		0.4167	0.5149
12			
	910807	0.0000	0.0000
4			
	911003	0.6250	0.5175
8			
Sebastes atrovirens adult		0.7500	0.9653
12			
	910807	1.0000	0.8165
4			
	911003	0.6250	1.0607
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910807	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			
Paralabrax clathratus adult		0.1667	0.3892
12			
	910807	0.2500	0.5000
4			
	911003	0.1250	0.3536
8			
Paralabrax clathratus juvenile		0.0000	0.0000
12			
	910807	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			
Semicossyphus pulcher male		0.3333	0.6513
12			
	910807	0.0000	0.0000
4			
	911003	0.5000	0.7559
8			
Semicossyphus pulcher female		1.5833	1.6765
12			
	910807	1.2500	1.2583
4			
	911003	1.7500	1.9086
8			
Embiotoca jacksoni adult		2.8333	1.4668
12			
	910807	2.7500	0.5000
4			
	911003	2.8750	1.8077

Embiotoca jacksoni juvenile		0.0833	0.2887
	910807	0.2500	0.5000
	911003	0.0000	0.0000
Embiotoca lateralis adult		1.5000	1.3143
	910807	2.0000	1.8257
	911003	1.2500	1.0351
Embiotoca lateralis juvenile		0.7500	1.1382
	910807	0.7500	0.5000
	911003	0.7500	1.3887
Damalichthys vacca adult		1.5833	1.3790
	910807	2.0000	2.3094
	911003	1.3750	0.7440
Damalichthys vacca juvenile		0.0000	0.0000
	910807	0.0000	0.0000
	911003	0.0000	0.0000
Hypsypops rubicundus adult		0.0000	0.0000
	910807	0.0000	0.0000
	911003	0.0000	0.0000
Hypsypops rubicundus juvenile		0.0000	0.0000
	910807	0.0000	0.0000
	911003	0.0000	0.0000
Girella nigricans adult		0.0833	0.2887

LOCATION 4 SANTA ROSA ISLAND - JOHNSON'S LEE SOUTH 38

	910807	0.2500	0.5000
4			
	911003	0.0000	0.0000
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910807	0.0000	0.0000
4			
	911003	0.0000	0.0000
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Tethya aurantia

(cases) N=	21
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	4.8%
40 - 49	4.8%
50 - 59	19.0%
60 - 69	19.0%
70 - 79	14.3%
80 - 89	14.3%
90 - 99	14.3%
> 99	9.5%
min size (mm)	37
max size (mm)	128
mean	74
mode	62

Haliotis rufescens

(cases) N=	4
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	25.0%
60 - 64	0.0
65 - 69	0.0
70 - 74	25.0%
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	25.0%
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
110 - 114	0.0
115 - 119	0.0
120 - 124	0.0
125 - 129	0.0
130 - 134	0.0
135 - 139	0.0
140 - 144	0.0
145 - 149	0.0
150 - 154	0.0
155 - 159	0.0
160 - 164	0.0
165 - 169	25.0%
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	55
max size (mm)	165
mean	97
mode	55

Hinnites giganteus

(cases) N=	33
< 10	0.0
10 - 19	6.1%
20 - 29	6.1%
30 - 39	15.2%
40 - 49	9.1%
50 - 59	6.1%
60 - 69	24.2%
70 - 79	9.1%
80 - 89	9.1%
90 - 99	6.1%
100 - 109	3.0%
110 - 119	3.0%
120 - 129	0.0
130 - 139	0.0
140 - 149	0.0
> 149	3.0%
min size (mm)	15
max size (mm)	160
mean	61
mode	60

Pisaster giganteus

(cases) N=	46
< 20	0.0
20 - 39	8.7%
40 - 59	28.3%
60 - 79	37.0%
80 - 99	13.0%
100 - 119	0.0
120 - 139	2.2%
140 - 159	0.0
160 - 179	2.2%
180 - 199	4.3%
200 - 219	2.2%
220 - 239	2.2%
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	24
max size (mm)	230
mean	78
mode	52

Patiria miniata

(cases) N=	129
< 10	.8%
10 - 19	0.0
20 - 29	.8%
30 - 39	10.1%
40 - 49	8.5%
50 - 59	18.6%
60 - 69	38.0%
70 - 79	14.0%
80 - 89	7.8%
90 - 99	1.6%
> 99	0.0
min size (mm)	5
max size (mm)	90
mean	59
mode	65

Pycnopodia helianthoides

(cases) N=	67
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	6.0%
80 - 99	16.4%
100 - 119	26.9%
120 - 139	25.4%
140 - 159	9.0%
160 - 179	4.5%
180 - 199	6.0%
200 - 219	4.5%
220 - 239	1.5%
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	63
max size (mm)	225
mean	127
mode	110

Strongylocentrotus franciscanus

(cases) N=	107
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	.9%
20 - 24	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	2.8%
40 - 44	3.7%
45 - 49	3.7%
50 - 54	4.7%
55 - 59	6.5%
60 - 64	4.7%
65 - 69	5.6%
70 - 74	4.7%
75 - 79	8.4%
80 - 84	7.5%
85 - 90	9.3%
90 - 94	7.5%
95 - 99	8.4%
100 - 104	7.5%
105 - 109	4.7%
> 109	7.5%
min size (mm)	18
max size (mm)	121
mean	79
mode	95

Strongylocentrotus purpuratus

(cases) N=	96
< 5	0.0
5 - 9	0.0
10 - 14	1.0%
15 - 19	1.0%
20 - 24	4.2%
25 - 29	17.7%
30 - 34	16.7%
35 - 39	17.7%
40 - 44	10.4%
45 - 49	16.7%
50 - 54	7.3%
55 - 59	2.1%
60 - 64	0.0
65 - 69	1.0%
70 - 74	1.0%
75 - 79	1.0%
80 - 84	0.0
85 - 90	1.0%
90 - 94	0.0
95 - 99	1.0%
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	14
max size (mm)	97
mean	39
mode	27

Macrocystis pyrifera numbers of stipes.

(cases) N=	90
< 3	7.8%
3 - 5	4.4%
6 -8	11.1%
9 -11	16.7%
12 - 14	14.4%
15 - 17	10.0%
18 - 20	12.2%
21 - 23	12.2%
24 - 26	6.7%
27 - 29	1.1%
30 - 32	1.1%
33 - 35	0.0
36 - 38	1.1%
39 - 41	0.0
42 - 44	0.0
>44	1.1%
min number	1
max number	57
mean	15
mode	11

Macrocystis pyrifera holdfast diameters

(cases) N=	90
< 6	0.0
6 - 11	5.6%
12 - 17	2.2%
18 - 23	3.3%
24 - 29	12.2%
30 - 35	22.2%
36 - 41	20.0%
42 - 47	13.3%
48 - 53	15.6%
54 - 59	4.4%
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	1.1%
min width (cm)	6
max width (cm)	285
mean	39
mode	34

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.5250	0.6973	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0750	0.2447	20
Macrocystis pyrifera juvenile	0.0500	0.1539	20
Macrocystis pyrifera all	0.5750	0.7304	20
Cypraea spadicea	0.0500	0.1539	20
Astraea undosa	0.0000	0.0000	20
Patiria miniata	2.9000	1.4921	20
Pisaster giganteus	0.3000	0.4413	20
Strongylocentrotus franciscanus	2.1750	3.6824	20
Strongylocentrotus purpuratus	1.3000	3.4159	20
Parastichopus parvimensis	0.0000	0.0000	20
Styela monteryensis	0.4250	0.4375	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.0500	0.1539	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.1056	0.0514	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0458	0.0190	12
Lophogorgia chilensis	0.0014	0.0048	12
Muricea fruticosa	0.0000	0.0000	

12	Muricea californica	0.0000	0.0000
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0000	0.0000
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0042	0.0075
12	Megathura crenulata	0.0083	0.0112
12	Hinnites giganteus	0.0014	0.0048
12	Aplysia californica	0.0000	0.0000
12	Pycnopodia helianthoides	0.0694	0.0407
12	Lytechinus anamesus	0.0000	0.0000

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.0000	0.0000	25
Miscellaneous brown algae	0.1000	0.5000	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.2000	1.0000	25
Cystoseira spp.	0.0000	0.0000	25
Macrocystis, Eisenia, Pterygophora	9.1000	11.9652	25
Miscellaneous red algae	14.8000	8.7476	25
Articulated coralline algae	1.1000	2.2913	25
Crustose coralline algae	23.2000	11.9574	25
Gelidium spp.	0.1000	0.5000	25
Gigartina spp.	0.6000	1.6583	25
Miscellaneous plants	1.8000	3.7165	25
Sponges	1.9000	3.0000	25
Corynactis californica	0.6000	1.4930	25
Balanophyllia elegans	7.5000	5.0000	25
Astrangia lajollaensis	11.1000	10.9943	25
Diopatra ornata	8.8000	9.3296	25
Phragmatopoma californica	1.1000	2.5083	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	9.7000	9.0807	25
Diaperoecia californica	4.8000	5.5396	25
Tunicates	3.3000	3.7997	25
Miscellaneous invertebrates	11.8000	10.8858	25
Bare substrate	9.9000	9.8287	25
Rock	80.4000	17.2554	

25	Cobble	6.9000	6.8572
25	Sand	12.7000	13.8617
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	2.7708	5.0421
144			
	Chromis punctipinnis	1.1667	1.6422
12			
	Oxyjulis californica	0.4167	0.6686
12			
	Sebastes mystinus	14.8333	8.2333
12			
	Sebastes serranoides	1.1667	1.8007
12			
	Sebastes atrovirens	2.5000	2.9077
12			
	Paralabrax clathratus	0.7500	0.8660
12			
	Semicossyphus pulcher	8.1667	2.5166
12			
	Embiotoca jacksoni	1.0000	1.1282
12			
	Embiotoca lateralis	3.0833	2.2344
12			
	Damalichthys vacca	0.1667	0.3892
12			
	Hypsypops rubicundus	0.0000	0.0000
12			
	Girella nigricans	0.0000	0.0000
12			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		1.1667	1.6422	12
	910709	0.5000	0.5774	4
	911002	1.5000	1.9272	8
Chromis punctipinnis juvenile		0.0000	0.0000	12
	910709	0.0000	0.0000	4
	911002	0.0000	0.0000	8
Oxyjulis californica adult		0.4167	0.6686	12
	910709	0.2500	0.5000	4
	911002	0.5000	0.7559	8
Oxyjulis californica juvenile		0.0000	0.0000	12
	910709	0.0000	0.0000	4
	911002	0.0000	0.0000	8
Sebastes mystinus adult		1.0833	0.9003	12
	910709	1.0000	0.8165	4
	911002	1.1250	0.9910	8
Sebastes mystinus juvenile		13.7500	8.2145	12
	910709	22.7500	6.2383	4
	911002	9.2500	4.4641	8
Sebastes serranoides adult		0.5000	1.1677	12
	910709	1.5000	1.7321	4
	911002	0.0000	0.0000	8

Sebastes serranoides juvenile		0.6667	0.9847
12			
	910709	1.7500	0.9574
4			
	911002	0.1250	0.3536
8			
Sebastes atrovirens adult		2.4167	2.9375
12			
	910709	6.0000	2.1602
4			
	911002	0.6250	0.7440
8			
Sebastes atrovirens juvenile		0.0833	0.2887
12			
	910709	0.0000	0.0000
4			
	911002	0.1250	0.3536
8			
Paralabrax clathratus adult		0.7500	0.8660
12			
	910709	0.7500	0.9574
4			
	911002	0.7500	0.8864
8			
Paralabrax clathratus juvenile		0.0000	0.0000
12			
	910709	0.0000	0.0000
4			
	911002	0.0000	0.0000
8			
Semicossyphus pulcher male		3.2500	1.4222
12			
	910709	2.0000	0.8165
4			
	911002	3.8750	1.2464
8			
Semicossyphus pulcher female		4.9167	2.1515
12			
	910709	3.7500	1.8930
4			
	911002	5.5000	2.1381
8			
Embiotoca jacksoni adult		1.0000	1.1282
12			
	910709	0.7500	1.5000
4			

	911002	1.1250	0.9910
8			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910709	0.0000	0.0000
4			
	911002	0.0000	0.0000
8			
Embiotoca lateralis adult		1.7500	1.1382
12			
	910709	2.2500	0.9574
4			
	911002	1.5000	1.1952
8			
Embiotoca lateralis juvenile		1.3333	1.7233
12			
	910709	3.0000	1.6330
4			
	911002	0.5000	1.0690
8			
Damalichthys vacca adult		0.1667	0.3892
12			
	910709	0.2500	0.5000
4			
	911002	0.1250	0.3536
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910709	0.0000	0.0000
4			
	911002	0.0000	0.0000
8			
Hypsypops rubicundus adult		0.0000	0.0000
12			
	910709	0.0000	0.0000
4			
	911002	0.0000	0.0000
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910709	0.0000	0.0000
4			
	911002	0.0000	0.0000
8			
Girella nigricans adult		0.0000	0.0000

12
910709 0.0000 0.0000
4
911002 0.0000 0.0000
8

Girella nigricans juvenile 0.0000 0.0000
12
910709 0.0000 0.0000
4
911002 0.0000 0.0000
8

1991 SIZE FREQUENCY DISTRIBUTIONS

Tethya aurantia

(cases) N=	64
< 10	0.0
10 - 19	1.6%
20 - 29	3.1%
30 - 39	1.6%
40 - 49	20.3%
50 - 59	17.2%
60 - 69	18.8%
70 - 79	14.1%
80 - 89	9.4%
90 - 99	4.7%
> 99	7.8%
min size (mm)	19
max size (mm)	112
mean	65
mode	46

Megathura crenulata

(cases) N=	14
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	0.0
60 - 69	0.0
70 - 79	14.3%
80 - 89	28.6%
90 - 99	50.0%
100 - 109	7.1%
110 - 119	0.0
> 119	0.0
min size (mm)	78
max size (mm)	107
mean	89
mode	90

Patiria miniata

(cases) N=	56
< 10	0.0
10 - 19	1.8%
20 - 29	8.9%
30 - 39	19.6%
40 - 49	14.3%
50 - 59	5.4%
60 - 69	23.2%
70 - 79	23.2%
80 - 89	3.6%
90 - 99	0.0
> 99	0.0
min size (mm)	16
max size (mm)	88
mean	54
mode	70

Pisaster giganteus

(cases) N=	34
< 20	0.0
20 - 39	5.9%
40 - 59	23.5%
60 - 79	41.2%
80 - 99	20.6%
100 - 119	8.8%
120 - 139	0.0
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	34
max size (mm)	111
mean	70
mode	54

Pycnopodia helianthoides

(cases) N=	57
< 20	0.0
20 - 39	17.5%
40 - 59	10.5%
60 - 79	15.8%
80 - 99	15.8%
100 - 119	3.5%
120 - 139	3.5%
140 - 159	8.8%
160 - 179	8.8%
180 - 199	5.3%
200 - 219	5.3%
220 - 239	5.3%
>239	0.0
min size (mm)	20
max size (mm)	231
mean	104
mode	32

Strongylocentrotus purpuratus

(cases) N=	110
< 5	0.0
5 - 9	0.0
10 - 14	.9%
15 - 19	0.0
20 - 24	.9%
25 - 29	3.6%
30 - 34	11.8%
35 - 39	17.3%
40 - 44	19.1%
45 - 49	18.2%
50 - 54	15.5%
55 - 59	8.2%
60 - 64	3.6%
65 - 69	.9%
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	12
max size (mm)	68
mean	44
mode	39

Strongylocentrotus franciscanus

(cases) N=	120
< 5	0.0
5 - 9	0.0
10 - 14	2.5%
15 - 19	3.3%
20 - 24	2.5%
25 - 29	2.5%
30 - 34	.8%
35 - 39	0.0
40 - 44	5.0%
45 - 49	5.8%
50 - 54	5.0%
55 - 59	7.5%
60 - 64	7.5%
65 - 69	11.7%
70 - 74	10.0%
75 - 79	10.0%
80 - 84	10.0%
85 - 90	6.7%
90 - 94	4.2%
95 - 99	1.7%
100 - 104	.8%
105 - 109	1.7%
> 109	.8%
min size (mm)	12
max size (mm)	119
mean	64
mode	80

Macrocystis pyrifera numbers of stipes.

(cases) N=	100
< 3	2.0%
3 - 5	12.0%
6 -8	26.0%
9 -11	26.0%
12 - 14	14.0%
15 - 17	7.0%
18 - 20	2.0%
21 - 23	2.0%
24 - 26	2.0%
27 - 29	5.0%
30 - 32	0.0
33 - 35	0.0
36 - 38	0.0
39 - 41	0.0
42 - 44	1.0%
>44	1.0%
min number	1
max number	47
mean	11
mode	9

Macrocystis pyrifera holdfast diameters.

(cases) N=	100
< 6	6.0%
6 - 11	50.0%
12 - 17	19.0%
18 - 23	5.0%
24 - 29	4.0%
30 - 35	7.0%
36 - 41	3.0%
42 - 47	3.0%
48 - 53	3.0%
54 - 59	0.0
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	3
max width (cm)	52
mean	15
mode	7

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.9250	1.1154	20
Eisenia arborea	0.2000	0.7847	20
Pterygophora californica	0.1750	0.4667	20
Laminaria farlowii	0.0500	0.1539	20
Macrocystis pyrifera juvenile	2.6750	6.1028	20
Macrocystis pyrifera all	3.6000	6.8817	20
Cypraea spadicea	0.3000	0.4702	20
Astraea undosa	0.0500	0.1539	20
Patiria miniata	1.9250	1.7938	20
Pisaster giganteus	0.2500	0.3804	20
Strongylocentrotus franciscanus	0.5000	0.9319	20
Strongylocentrotus purpuratus	16.5750	21.4864	20
Parastichopus parvimensis	0.9500	0.9018	20
Styela monteryensis	0.0500	0.1539	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.5750	0.5447	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0139	0.0139	12
Allopora californica	0.0153	0.0166	12
Tealia lofotensis	0.0014	0.0048	12
Lophogorgia chilensis	0.1625	0.0817	12

Muricea fruticosa	0.0014	0.0048	12
Muricea californica	0.0000	0.0000	12
Panulirus interruptus	0.0000	0.0000	12
Haliotis rufescens	0.0000	0.0000	12
Haliotis corrugata	0.0000	0.0000	12
Haliotis fulgens	0.0000	0.0000	12
Kelletia kelletii	0.0250	0.0219	12
Megathura crenulata	0.0458	0.0294	12
Hinnites giganteus	0.0125	0.0161	12
Aplysia californica	0.0014	0.0048	12
Pycnopodia helianthoides	0.0083	0.0112	12
Lytechinus anamesus	0.5500	0.6271	12

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.9000	2.4238	25
Miscellaneous brown algae	1.8000	2.7500	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.5000	2.0412	25
Cystoseira spp.	0.4000	1.3844	25
Macrocystis, Eisenia, Pterygophora	24.9000	22.4824	25
Miscellaneous red algae	15.7000	10.8138	25
Articulated coralline algae	2.1000	3.2819	25
Crustose coralline algae	49.7000	17.2651	25
Gelidium spp.	0.2000	0.6922	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	0.2000	0.6922	25
Sponges	1.6000	2.1506	25
Corynactis californica	4.6000	5.2381	25
Balanophyllia elegans	4.8000	4.8369	25
Astrangia lajollaensis	1.6000	2.6887	25
Diopatra ornata	2.2000	4.2279	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	9.6000	7.8621	25
Diaperoecia californica	6.8000	9.3408	25
Tunicates	1.3000	2.2958	25
Miscellaneous invertebrates	12.8000	7.5457	25
Bare substrate	5.6000	7.5097	25

Rock	92.9000	11.1262	25
Cobble	2.2000	4.6949	25
Sand	4.9000	8.8530	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	1.9444	3.9344	144
Chromis punctipinnis	7.3333	9.5473	12
Oxyjulis californica	0.5833	1.1645	12
Sebastes mystinus	7.0000	5.2223	12
Sebastes serranoides	0.6667	0.6513	12
Sebastes atrovirens	1.3333	0.8876	12
Paralabrax clathratus	0.5000	0.7977	12
Semicossyphus pulcher	1.0833	0.9003	12
Embiotoca jacksoni	1.8333	1.0299	12
Embiotoca lateralis	0.5000	0.9045	12
Damalichthys vacca	1.4167	1.2401	12
Hypsypops rubicundus	0.5000	0.5222	12
Girella nigricans	0.5833	1.1645	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		7.0000	9.7608	12
	910917	19.5000	5.8023	4
	911017	0.7500	1.1650	8
Chromis punctipinnis juvenile		0.3333	0.6513	12
	910917	0.0000	0.0000	4
	911017	0.5000	0.7559	8
Oxyjulis californica adult		0.5833	1.1645	12
	910917	1.5000	1.7321	4
	911017	0.1250	0.3536	8
Oxyjulis californica juvenile		0.0000	0.0000	12
	910917	0.0000	0.0000	4
	911017	0.0000	0.0000	8
Sebastes mystinus adult		0.5833	0.6686	12
	910917	0.0000	0.0000	4
	911017	0.8750	0.6409	8
Sebastes mystinus juvenile		6.4167	5.4848	12
	910917	12.0000	6.2716	4
	911017	3.6250	1.9226	8
Sebastes serranoides adult		0.0000	0.0000	12
	910917	0.0000	0.0000	4
	911017	0.0000	0.0000	8

Sebastes serranoides juvenile		0.6667	0.6513
12			
	910917	0.5000	0.5774
4			
	911017	0.7500	0.7071
8			
Sebastes atrovirens adult		1.3333	0.8876
12			
	910917	1.5000	1.2910
4			
	911017	1.2500	0.7071
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910917	0.0000	0.0000
4			
	911017	0.0000	0.0000
8			
Paralabrax clathratus adult		0.4167	0.7930
12			
	910917	0.0000	0.0000
4			
	911017	0.6250	0.9161
8			
Paralabrax clathratus juvenile		0.0833	0.2887
12			
	910917	0.0000	0.0000
4			
	911017	0.1250	0.3536
8			
Semicossyphus pulcher male		0.3333	0.6513
12			
	910917	0.7500	0.9574
4			
	911017	0.1250	0.3536
8			
Semicossyphus pulcher female		0.7500	0.9653
12			
	910917	1.0000	1.1547
4			
	911017	0.6250	0.9161
8			
Embiotoca jacksoni adult		1.3333	1.0731
12			
	910917	1.5000	1.0000
4			
	911017	1.2500	1.1650

Embiotoca jacksoni juvenile		0.5000	0.7977
12			
	910917	0.0000	0.0000
4			
	911017	0.7500	0.8864
8			
Embiotoca lateralis adult		0.5000	0.9045
12			
	910917	1.2500	1.2583
4			
	911017	0.1250	0.3536
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910917	0.0000	0.0000
4			
	911017	0.0000	0.0000
8			
Damalichthys vacca adult		0.9167	1.0836
12			
	910917	1.0000	0.8165
4			
	911017	0.8750	1.2464
8			
Damalichthys vacca juvenile		0.5000	0.7977
12			
	910917	0.0000	0.0000
4			
	911017	0.7500	0.8864
8			
Hypsypops rubicundus adult		0.5000	0.5222
12			
	910917	0.5000	0.5774
4			
	911017	0.5000	0.5345
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910917	0.0000	0.0000
4			
	911017	0.0000	0.0000
8			
Girella nigricans adult		0.5833	1.1645
12			

	910917	0.7500	1.5000
4			
	911017	0.5000	1.0690
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910917	0.0000	0.0000
4			
	911017	0.0000	0.0000
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Kelletia kelletii

(cases) N=	40
< 40	0.0
40 - 49	5.0%
50 - 59	0.0
60 - 69	0.0
70 - 79	0.0
80 - 89	20.0%
90 - 99	37.5%
100 - 109	27.5%
110 - 119	10.0%
120 - 129	0.0
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	47
max size (mm)	114
mean	95
mode	102

Megathura crenulata

(cases) N=	38
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	5.3%
60 - 69	39.5%
70 - 79	28.9%
80 - 89	26.3%
90 - 99	0.0
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	57
max size (mm)	88
mean	72
mode	68

Pycnopodia helianthoides

(cases) N=	10
< 20	40.0%
20 - 39	0.0
40 - 59	0.0
60 - 79	0.0
80 - 99	0.0
100 - 119	0.0
120 - 139	0.0
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	20.0%
220 - 239	10.0%
240 - 259	20.0%
260 - 279	10.0%
> 279	0.0
min size (mm)	3
max size (mm)	276
mean	140
mode	200

Patiria miniata

(cases) N=	58
< 10	0.0
10 - 19	5.2%
20 - 29	19.0%
30 - 39	19.0%
40 - 49	15.5%
50 - 59	19.0%
60 - 69	17.2%
70 - 79	5.2%
80 - 89	0.0
90 - 99	0.0
> 99	0.0
min size (mm)	17
max size (mm)	75
mean	44
mode	29

Pisaster giganteus

(cases) N=	39
< 20	5.1%
20 - 39	10.3%
40 - 59	5.1%
60 - 79	23.1%
80 - 99	43.6%
100 - 119	12.8%
120 - 139	0.0
140 - 159	0.0
160 - 179	0.0
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	3
max size (mm)	116
mean	73
mode	84

Lytechinus anamesus

(cases) N=	135
< 5	0.0
5 - 9	1.5%
10 - 14	13.3%
15 - 19	45.9%
20 - 24	34.8%
25 - 29	3.7%
30 - 34	.7%
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
> 49	0.0
min size (mm)	6
max size (mm)	30
mean	18
mode	17

Strongylocentrotus franciscanus

(cases) N=	129
< 5	0.0
5 - 9	7.8%
10 - 14	17.1%
15 - 19	17.1%
20 - 24	7.0%
25 - 29	4.7%
30 - 34	11.6%
35 - 39	5.4%
40 - 44	10.1%
45 - 49	5.4%
50 - 54	7.0%
55 - 59	3.1%
60 - 64	3.1%
65 - 69	.8%
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	5
max size (mm)	66
mean	28
mode	10

Strongylocentrotus purpuratus

(cases) N=	116
< 5	0.0
5 - 9	2.6%
10 - 14	4.3%
15 - 19	6.0%
20 - 24	9.5%
25 - 29	16.4%
30 - 34	17.2%
35 - 39	15.5%
40 - 44	16.4%
45 - 49	7.8%
50 - 54	4.3%
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	5
max size (mm)	52
mean	32
mode	25

Macrocystis pyrifera numbers of stipes.

(cases) N=	84
< 3	2.4%
3 - 5	9.5%
6 -8	26.2%
9 -11	27.4%
12 - 14	19.0%
15 - 17	9.5%
18 - 20	2.4%
21 - 23	2.4%
24 - 26	0.0
27 - 29	0.0
30 - 32	0.0
33 - 35	1.2%
36 - 38	0.0
39 - 41	0.0
42 - 44	0.0
>44	0.0
min number	2
max number	35
mean	10
mode	8

Macrocystis pyrifera holdfast diameters

(cases) N=	84
< 6	0.0
6 - 11	2.4%
12 - 17	13.1%
18 - 23	25.0%
24 - 29	26.2%
30 - 35	21.4%
36 - 41	4.8%
42 - 47	4.8%
48 - 53	1.2%
54 - 59	1.2%
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	10
max width (cm)	56
mean	26
mode	23

Lophogorgia chilensis heights.

(cases) N=	70
< 5	0.0
5 - 8	1.4%
9 - 12	2.9%
13 - 16	5.7%
17 - 20	7.1%
21 - 24	15.7%
25 - 28	12.9%
29 - 32	15.7%
33 - 36	11.4%
37 - 40	11.4%
41 - 44	4.3%
45 - 48	0.0
49 - 52	1.4%
53 - 56	4.3%
57 - 60	0.0
61 - 64	1.4%
65 - 68	0.0
69 - 72	4.3%
73 - 76	0.0
77 - 80	0.0
81 - 84	0.0
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min height (cm)	8
max height (cm)	72
mean	31
mode	23

Lophogorgia chilensis widths.

(cases) N=	70
< 5	2.9%
5 - 8	14.3%
9 - 12	15.7%
13 - 16	17.1%
17 - 20	8.6%
21 - 24	11.4%
25 - 28	5.7%
29 - 32	5.7%
33 - 36	4.3%
37 - 40	2.9%
41 - 44	1.4%
45 - 48	1.4%
49 - 52	1.4%
53 - 56	0.0
57 - 60	2.9%
61 - 64	1.4%
65 - 68	0.0
69 - 72	1.4%
73 - 76	0.0
77 - 80	1.4%
81 - 84	0.0
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min width (cm)	4
max width (cm)	79
mean	22
mode	10

Allopora californica heights.

(cases) N=	49
< 3	22.4%
3 - 4	10.2%
5 - 6	20.4%
7 - 8	16.3%
9 - 10	12.2%
11 - 12	12.2%
13 - 14	2.0%
15 - 16	0.0
17 - 18	2.0%
19 - 20	0.0
21 - 22	0.0
23 - 24	2.0%
25 - 26	0.0
27 - 28	0.0
29 - 30	0.0
>30	0.0
min height (cm)	1
max height (cm)	23
mean	7
mode	1

Allopora californica widths.

(cases) N=	49
< 3	14.3%
3 - 4	12.2%
5 - 6	6.1%
7 - 8	2.0%
9 - 10	16.3%
11 - 12	10.2%
13 - 14	0.0
15 - 16	10.2%
17 - 18	2.0%
19 - 20	6.1%
21 - 22	8.2%
23 - 24	0.0
25 - 26	4.1%
27 - 28	0.0
29 - 30	6.1%
>30	2.0%
min width (cm)	1
max width (cm)	35
mean	12
mode	10

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.1250	0.3193	20
Laminaria farlowii	0.1000	0.2616	20
Macrocystis pyrifera juvenile	0.1250	0.2751	20
Macrocystis pyrifera all	0.1250	0.2751	20
Cypraea spadicea	0.6250	0.7048	20
Astraea undosa	0.0250	0.1118	20
Patiria miniata	1.4000	1.1192	20
Pisaster giganteus	0.3000	0.3403	20
Strongylocentrotus franciscanus	1.5750	2.2081	20
Strongylocentrotus purpuratus	4.7500	5.5072	20
Parastichopus parvimensis	1.9750	0.9931	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	2.3250	2.1660	20
Coryphopterus nicholsii	2.5000	2.2302	20
Alloclinus holderi	0.1250	0.2221	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0139	0.0156	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.1181	0.1366	12
Muricea fruticosa	0.0042	0.0144	

12	Muricea californica	0.0000	0.0000
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0014	0.0048
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0139	0.0340
12	Megathura crenulata	0.1903	0.1278
12	Hinnites giganteus	0.0042	0.0104
12	Aplysia californica	0.0042	0.0075
12	Pycnopodia helianthoides	0.0000	0.0000
12	Lytechinus anamesus	2.2042	2.6313

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.7000	2.0052	25
Miscellaneous brown algae	0.4000	1.3844	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.4000	1.1815	25
Cystoseira spp.	0.0000	0.0000	25
Macrocystis, Eisenia, Pterygophora	0.0000	0.0000	25
Miscellaneous red algae	10.2000	10.2804	25
Articulated coralline algae	0.9000	1.4216	25
Crustose coralline algae	28.9000	12.3550	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	0.1000	0.5000	25
Sponges	0.7000	1.1456	25
Corynactis californica	1.3000	1.7854	25
Balanophyllia elegans	0.5000	1.0206	25
Astrangia lajollaensis	30.1000	10.8609	25
Diopatra ornata	0.4000	1.1815	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	5.5000	4.4488	25
Diaperoecia californica	3.9000	4.4535	25
Pachythyone rubra	15.5000	20.4761	25
Tunicates	0.3000	0.8292	25
Miscellaneous invertebrates	13.9000	8.2941	25
Bare substrate	9.8000	7.9359	

25	Rock	77.8000	22.9506
25	Cobble	15.3000	20.5816
25	Sand	6.8000	9.9352
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	33.2639	137.1031
144			
	Chromis punctipinnis	358.6667	343.6241
12			
	Oxyjulis californica	3.9167	1.9752
12			
	Sebastes mystinus	9.7500	7.9444
12			
	Sebastes serranoides	0.7500	1.4222
12			
	Sebastes atrovirens	3.8333	2.6227
12			
	Paralabrax clathratus	6.5000	3.8964
12			
	Semicossyphus pulcher	10.9167	4.2950
12			
	Embiotoca jacksoni	1.9167	1.0836
12			
	Embiotoca lateralis	0.0000	0.0000
12			
	Damalichthys vacca	1.0000	0.8528
12			
	Hypsypops rubicundus	1.5833	1.5050
12			
	Girella nigricans	0.3333	0.6513
12			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		97.6667	100.4900	12
	910710	47.7500	22.3961	4
	911001	122.6250	116.2669	8
Chromis punctipinnis juvenile		261.0000	359.7552	12
	910710	683.7500	337.5741	4
	911001	49.6250	36.8159	8
Oxyjulis californica adult		1.6667	1.4355	12
	910710	1.0000	2.0000	4
	911001	2.0000	1.0690	8
Oxyjulis californica juvenile		2.2500	2.1794	12
	910710	4.0000	1.8257	4
	911001	1.3750	1.8468	8
Sebastes mystinus adult		0.0000	0.0000	12
	910710	0.0000	0.0000	4
	911001	0.0000	0.0000	8
Sebastes mystinus juvenile		9.7500	7.9444	12
	910710	18.7500	7.8049	4
	911001	5.2500	1.9086	8
Sebastes serranoides adult		0.4167	0.7930	12
	910710	1.2500	0.9574	4
	911001	0.0000	0.0000	8

Sebastes serranoides juvenile		0.3333	0.7785
12			
	910710	1.0000	1.1547
4			
	911001	0.0000	0.0000
8			
Sebastes atrovirens adult		3.8333	2.6227
12			
	910710	1.0000	0.8165
4			
	911001	5.2500	1.9086
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Paralabrax clathratus adult		4.6667	3.3121
12			
	910710	2.5000	2.0817
4			
	911001	5.7500	3.3700
8			
Paralabrax clathratus juvenile		1.8333	1.2673
12			
	910710	1.0000	1.4142
4			
	911001	2.2500	1.0351
8			
Semicossyphus pulcher male		0.7500	0.8660
12			
	910710	0.5000	0.5774
4			
	911001	0.8750	0.9910
8			
Semicossyphus pulcher female		10.1667	4.4890
12			
	910710	13.2500	6.8496
4			
	911001	8.6250	1.8468
8			
Embiotoca jacksoni adult		1.9167	1.0836
12			
	910710	1.5000	0.5774
4			

	911001	2.1250	1.2464
8			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Damalichthys vacca adult		1.0000	0.8528
12			
	910710	0.5000	0.5774
4			
	911001	1.2500	0.8864
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Hypsypops rubicundus adult		1.5833	1.5050
12			
	910710	2.2500	1.8930
4			
	911001	1.2500	1.2817
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910710	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Girella nigricans adult		0.3333	0.6513

LOCATION 7 SANTA CRUZ ISLAND - FRY'S HARBOR 70

12
910710 0.7500 0.9574
4
911001 0.1250 0.3536
8

Girella nigricans juvenile 0.0000 0.0000
12
910710 0.0000 0.0000
4
911001 0.0000 0.0000
8

1991 SIZE FREQUENCY DISTRIBUTIONS

Megathura crenulata

(cases) N=	35
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	11.4%
60 - 69	28.6%
70 - 79	57.1%
80 - 89	2.9%
90 - 99	0.0
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	55
max size (mm)	81
mean	70
mode	77

Hinnites giganteus

(cases) N=	31
< 10	0.0
10 - 19	0.0
20 - 29	3.2%
30 - 39	0.0
40 - 49	16.1%
50 - 59	16.1%
60 - 69	19.4%
70 - 79	6.5%
80 - 89	22.6%
90 - 99	6.5%
100 - 109	3.2%
110 - 119	3.2%
120 - 129	0.0
130 - 139	3.2%
140 - 149	0.0
> 149	0.0
min size (mm)	27
max size (mm)	131
mean	71
mode	67

Lytechinus anamesus

(cases) N=	132
< 5	0.0
5 - 9	0.0
10 - 14	1.5%
15 - 19	39.4%
20 - 24	51.5%
25 - 29	7.6%
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
> 49	0.0
min size (mm)	14
max size (mm)	28
mean	20
mode	21

Patiria miniata

(cases) N=	52
< 10	0.0
10 - 19	1.9%
20 - 29	3.8%
30 - 39	15.4%
40 - 49	11.5%
50 - 59	28.8%
60 - 69	25.0%
70 - 79	13.5%
80 - 89	0.0
90 - 99	0.0
> 99	0.0
min size (mm)	19
max size (mm)	79
mean	54
mode	53

Pisaster giganteus

(cases) N=	73
< 20	0.0
20 - 39	0.0
40 - 59	1.4%
60 - 79	1.4%
80 - 99	8.2%
100 - 119	28.8%
120 - 139	28.8%
140 - 159	13.7%
160 - 179	9.6%
180 - 199	6.8%
200 - 219	1.4%
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	51
max size (mm)	202
mean	130
mode	122

Strongylocentrotus franciscanus

(cases) N=	83
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	3.6%
25 - 29	6.0%
30 - 34	3.6%
35 - 39	3.6%
40 - 44	13.3%
45 - 49	8.4%
50 - 54	9.6%
55 - 59	3.6%
60 - 64	9.6%
65 - 69	7.2%
70 - 74	8.4%
75 - 79	2.4%
80 - 84	3.6%
85 - 90	3.6%
90 - 94	3.6%
95 - 99	4.8%
100 - 104	1.2%
105 - 109	1.2%
> 109	1.2%
min size (mm)	20
max size (mm)	121
mean	60
mode	43

Strongylocentrotus purpuratus

(cases) N=	100
< 5	0.0
5 - 9	0.0
10 - 14	1.0%
15 - 19	11.0%
20 - 24	12.0%
25 - 29	20.0%
30 - 34	24.0%
35 - 39	16.0%
40 - 44	7.0%
45 - 49	8.0%
50 - 54	0.0
55 - 59	0.0
60 - 64	1.0%
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	14
max size (mm)	62
mean	31
mode	29

Lophogorgia chilensis heights.

(cases) N=	40
< 5	0.0
5 - 8	0.0
9 - 12	5.0%
13 - 16	15.0%
17 - 20	15.0%
21 - 24	12.5%
25 - 28	2.5%
29 - 32	5.0%
33 - 36	7.5%
37 - 40	15.0%
41 - 44	0.0
45 - 48	15.0%
49 - 52	2.5%
53 - 56	2.5%
57 - 60	0.0
61 - 64	0.0
65 - 68	2.5%
69 - 72	0.0
73 - 76	0.0
77 - 80	0.0
81 - 84	0.0
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min height (cm)	10
max height (cm)	65
mean	30
mode	40

Lophogorgia chilensis widths.

(cases) N=	40
< 5	0.0
5 - 8	5.0%
9 - 12	5.0%
13 - 16	7.5%
17 - 20	17.5%
21 - 24	17.5%
25 - 28	5.0%
29 - 32	10.0%
33 - 36	5.0%
37 - 40	2.5%
41 - 44	2.5%
45 - 48	5.0%
49 - 52	5.0%
53 - 56	0.0
57 - 60	5.0%
61 - 64	2.5%
65 - 68	2.5%
69 - 72	0.0
73 - 76	2.5%
77 - 80	0.0
81 - 84	0.0
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min width (cm)	5
max width (cm)	75
mean	30
mode	30

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0250	0.1118	20
Macrocystis pyrifera juvenile	0.0250	0.1118	20
Macrocystis pyrifera all	0.0250	0.1118	20
Cypraea spadicea	0.0000	0.0000	20
Astraea undosa	0.8750	0.9014	20
Patiria miniata	0.0750	0.2447	20
Pisaster giganteus	0.0750	0.1832	20
Strongylocentrotus franciscanus	2.2250	1.8459	20
Strongylocentrotus purpuratus	8.7000	11.8025	20
Parastichopus parvimensis	0.4250	0.3726	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	2.5500	2.3221	20
Coryphopterus nicholsii	7.0750	3.2088	20
Alloclinus holderi	0.0500	0.1539	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0042	0.0075	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0486	0.0479	12
Muricea fruticosa	0.0000	0.0000	

12	Muricea californica	0.0000	0.0000
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0000	0.0000
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0167	0.0174
12	Megathura crenulata	0.0125	0.0190
12	Hinnites giganteus	0.0278	0.0239
12	Aplysia californica	0.0306	0.0292
12	Pycnopodia helianthoides	0.0028	0.0065
12	Lytechinus anamesus	0.0000	0.0000

LOCATION 8 SANTA CRUZ ISLAND - PELICAN BAY
1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	9.4000	7.5443	25
Miscellaneous brown algae	7.0000	8.4471	25
Desmarestia spp.	0.1000	0.5000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	0.0000	0.0000	25
Macrocystis, Eisenia, Pterygophora	0.0000	0.0000	25
Miscellaneous red algae	8.4000	4.5000	25
Articulated coralline algae	0.5000	1.2500	25
Crustose coralline algae	34.9000	12.8995	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	10.2000	8.9245	25
Sponges	0.5000	2.0412	25
Corynactis californica	2.4000	2.8395	25
Balanophyllia elegans	0.2000	0.6922	25
Astrangia lajollaensis	9.1000	6.4096	25
Diopatra ornata	0.1000	0.5000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	1.0000	1.7678	25
Bryozoans, other	2.0000	2.3936	25
Diaperoecia californica	0.0000	0.0000	25
Tunicates	0.3000	1.0992	25
Miscellaneous invertebrates	18.9000	9.1024	25
Bare substrate	31.9000	11.3486	25

	Rock	59.1000	16.3758
25			
	Cobble	15.3000	12.7132
25			
	Sand	25.6000	16.1097
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	16.1528	55.2622
144			
	Chromis punctipinnis	170.4167	105.6551
12			
	Oxyjulis californica	0.0000	0.0000
12			
	Sebastes mystinus	0.0000	0.0000
12			
	Sebastes serranoides	0.2500	0.4523
12			
	Sebastes atrovirens	0.3333	0.4924
12			
	Paralabrax clathratus	13.1667	6.3078
12			
	Semicossyphus pulcher	3.8333	2.4433
12			
	Embiotoca jacksoni	2.8333	1.5859
12			
	Embiotoca lateralis	0.0000	0.0000
12			
	Damalichthys vacca	0.5833	0.9962
12			
	Hypsypops rubicundus	2.0833	1.2401
12			
	Girella nigricans	0.3333	0.8876
12			

LOCATION 8 SANTA CRUZ ISLAND - PELICAN BAY
1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis	adult	4.5000	3.8964	12
	910708	1.5000	0.5774	4
	911001	6.0000	4.0000	8
Chromis punctipinnis	juvenile	165.9167	106.9660	12
	910708	285.2500	58.3402	4
	911001	106.2500	65.6892	8
Oxyjulis californica	adult	0.0000	0.0000	12
	910708	0.0000	0.0000	4
	911001	0.0000	0.0000	8
Oxyjulis californica	juvenile	0.0000	0.0000	12
	910708	0.0000	0.0000	4
	911001	0.0000	0.0000	8
Sebastes mystinus	adult	0.0000	0.0000	12
	910708	0.0000	0.0000	4
	911001	0.0000	0.0000	8
Sebastes mystinus	juvenile	0.0000	0.0000	12
	910708	0.0000	0.0000	4
	911001	0.0000	0.0000	8
Sebastes serranoides	adult	0.2500	0.4523	12
	910708	0.0000	0.0000	4
	911001	0.3750	0.5175	8

Sebastes serranoides juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Sebastes atrovirens adult		0.3333	0.4924
12			
	910708	0.2500	0.5000
4			
	911001	0.3750	0.5175
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Paralabrax clathratus adult		3.9167	3.9877
12			
	910708	0.2500	0.5000
4			
	911001	5.7500	3.6547
8			
Paralabrax clathratus juvenile		9.2500	3.8406
12			
	910708	7.7500	0.5000
4			
	911001	10.0000	4.5981
8			
Semicossyphus pulcher male		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Semicossyphus pulcher female		3.8333	2.4433
12			
	910708	2.5000	1.0000
4			
	911001	4.5000	2.7255
8			
Embiotoca jacksoni adult		2.6667	1.4975
12			
	910708	2.7500	2.5000
4			
	911001	2.6250	0.9161

8			
Embiotoca jacksoni juvenile		0.1667	0.3892
12			
	910708	0.0000	0.0000
4			
	911001	0.2500	0.4629
8			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Damalichthys vacca adult		0.5833	0.9962
12			
	910708	0.0000	0.0000
4			
	911001	0.8750	1.1260
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Hypsypops rubicundus adult		2.0833	1.2401
12			
	910708	2.5000	1.9149
4			
	911001	1.8750	0.8345
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			
Girella nigricans adult		0.3333	0.8876
12			

LOCATION 8 SANTA CRUZ ISLAND - PELICAN BAY

	910708	0.0000	0.0000
4			
	911001	0.5000	1.0690
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910708	0.0000	0.0000
4			
	911001	0.0000	0.0000
8			

LOCATION 8 SANTA CRUZ ISLAND - PELICAN BAY

1991 SIZE FREQUENCY DISTRIBUTIONS

Astraea undosa

(cases) N=	41
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	0.0
60 - 69	31.7%
70 - 79	56.1%
80 - 89	9.8%
90 - 99	2.4%
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	62
max size (mm)	91
mean	73
mode	74

Hinnites giganteus

(cases) N=	34
< 10	0.0
10 - 19	2.9%
20 - 29	0.0
30 - 39	14.7%
40 - 49	17.6%
50 - 59	26.5%
60 - 69	17.6%
70 - 79	11.8%
80 - 89	0.0
90 - 99	0.0
100 - 109	2.9%
110 - 119	0.0
120 - 129	5.9%
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	13
max size (mm)	129
mean	59
mode	52

Patiria miniata

(cases) N=	44
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	2.3%
40 - 49	15.9%
50 - 59	13.6%
60 - 69	27.3%
70 - 79	18.2%
80 - 89	15.9%
90 - 99	6.8%
> 99	0.0
min size (mm)	39
max size (mm)	94
mean	67
mode	69

Pisaster giganteus

(cases) N=	30
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	0.0
80 - 99	3.3%
100 - 119	0.0
120 - 139	6.7%
140 - 159	10.0%
160 - 179	20.0%
180 - 199	23.3%
200 - 219	20.0%
220 - 239	10.0%
240 - 259	3.3%
260 - 279	3.3%
280 - 299	0.0
> 299	0.0
min size (mm)	80
max size (mm)	264
mean	185
mode	80

LOCATION 8 SANTA CRUZ ISLAND - PELICAN BAY

Strongylocentrotus franciscanus

(cases) N=	103
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	1.0%
25 - 29	1.0%
30 - 34	9.7%
35 - 39	5.8%
40 - 44	9.7%
45 - 49	5.8%
50 - 54	8.7%
55 - 59	6.8%
60 - 64	13.6%
65 - 69	15.5%
70 - 74	10.7%
75 - 79	3.9%
80 - 84	3.9%
85 - 90	1.9%
90 - 94	1.9%
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	22
max size (mm)	93
mean	57
mode	68

Strongylocentrotus purpuratus

(cases) N=	102
< 5	0.0
5 - 9	0.0
10 - 14	1.0%
15 - 19	0.0
20 - 24	27.5%
25 - 29	34.3%
30 - 34	28.4%
35 - 39	4.9%
40 - 44	3.9%
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	11
max size (mm)	44
mean	28
mode	24

Lophogorgia chilensis

(cases) N=	53
< 5	0.0
5 - 8	1.9%
9 - 12	1.9%
13 - 16	7.5%
17 - 20	9.4%
21 - 24	15.1%
25 - 28	18.9%
29 - 32	13.2%
33 - 36	15.1%
37 - 40	13.2%
41 - 44	1.9%
45 - 48	1.9%
49 - 52	0.0
53 - 56	0.0
57 - 60	0.0
>61	0.0
min width (cm)	6
max width (cm)	48
mean	27
mode	27

Lophogorgia chilensis

(cases) N=	53
< 5	1.9%
5 - 8	0.0
9 - 12	1.9%
13 - 16	0.0
17 - 20	9.4%
21 - 24	5.7%
25 - 28	20.8%
29 - 32	20.8%
33 - 36	11.3%
37 - 40	7.0%
41 - 44	5.7%
45 - 48	1.9%
49 - 52	1.9%
53 - 56	1.9%
57 - 60	0.0
>61	0.0
min height (cm)	2
max height (cm)	53
mean	31
mode	26

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0000	0.0000	20
Macrocystis pyrifera juvenile	0.0000	0.0000	20
Macrocystis pyrifera all	0.0000	0.0000	20
Cypraea spadicea	0.0000	0.0000	20
Astraea undosa	1.1000	1.3822	20
Patiria miniata	0.2500	0.4136	20
Pisaster giganteus	0.0250	0.1118	20
Strongylocentrotus franciscanus	0.4000	0.4757	20
Strongylocentrotus purpuratus	56.3750	22.2207	20
Parastichopus parvimensis	0.2000	0.2513	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0750	0.1832	20
Coryphopterus nicholsii	1.3250	0.9216	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0000	0.0000	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0000	0.0000	12
Muricea fruticosa	0.0000	0.0000	

12	Muricea californica	0.0000	0.0000
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0000	0.0000
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0000	0.0000
12	Megathura crenulata	0.0542	0.0363
12	Hinnites giganteus	0.0042	0.0075
12	Aplysia californica	0.0097	0.0132
12	Pycnopodia helianthoides	0.0000	0.0000
12	Lytechinus anamesus	0.0569	0.1973

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.1000	0.5000	25
Miscellaneous brown algae	0.0000	0.0000	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	0.0000	0.0000	25
Macrocystis, Eisenia, Pterygophora	0.0000	0.0000	25
Miscellaneous red algae	0.3000	0.8292	25
Articulated coralline algae	1.4000	1.9203	25
Crustose coralline algae	49.4000	18.5023	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	0.0000	0.0000	25
Sponges	0.1000	0.5000	25
Corynactis californica	0.3000	1.0992	25
Balanophyllia elegans	0.3000	0.8292	25
Astrangia lajollaensis	1.6000	1.8930	25
Diopatra ornata	0.1000	0.5000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	3.5000	4.0182	25
Bryozoans, other	0.0000	0.0000	25
Diaperoecia californica	0.3000	1.0992	25
Tunicates	0.0000	0.0000	25
Miscellaneous invertebrates	11.8000	9.4240	25
Bare substrate	31.6000	16.8616	25

Rock	83.9000	18.7650	25
Cobble	4.2000	7.6281	25
Sand	11.9000	16.0611	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	2.3889	8.2937	144
Chromis punctipinnis	17.9167	23.8802	12
Oxyjulis californica	4.9167	2.5030	12
Sebastes mystinus	0.0000	0.0000	12
Sebastes serranoides	0.0833	0.2887	12
Sebastes atrovirens	0.0833	0.2887	12
Paralabrax clathratus	2.0833	1.9287	12
Semicossyphus pulcher	1.5000	1.2432	12
Embiotoca jacksoni	0.5000	0.7977	12
Embiotoca lateralis	0.0833	0.2887	12
Damalichthys vacca	0.0000	0.0000	12
Hypsypops rubicundus	0.7500	0.6216	12
Girella nigricans	0.7500	0.7538	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis	adult	3.3333	11.5470	12
	910920	0.0000	0.0000	4
	911004	5.0000	14.1421	8
Chromis punctipinnis	juvenile	14.5833	19.0046	12
	910920	25.0000	28.8675	4
	911004	9.3750	10.8356	8
Oxyjulis californica	adult	4.8333	2.4433	12
	910920	6.2500	2.6300	4
	911004	4.1250	2.1671	8
Oxyjulis californica	juvenile	0.0833	0.2887	12
	910920	0.0000	0.0000	4
	911004	0.1250	0.3536	8
Sebastes mystinus	adult	0.0000	0.0000	12
	910920	0.0000	0.0000	4
	911004	0.0000	0.0000	8
Sebastes mystinus	juvenile	0.0000	0.0000	12
	910920	0.0000	0.0000	4
	911004	0.0000	0.0000	8
Sebastes serranoides	adult	0.0833	0.2887	12
	910920	0.2500	0.5000	4
	911004	0.0000	0.0000	8

Sebastes serranoides juvenile		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Sebastes atrovirens adult		0.0833	0.2887
12			
	910920	0.0000	0.0000
4			
	911004	0.1250	0.3536
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Paralabrax clathratus adult		1.9167	1.8809
12			
	910920	2.7500	2.2174
4			
	911004	1.5000	1.6903
8			
Paralabrax clathratus juvenile		0.1667	0.3892
12			
	910920	0.0000	0.0000
4			
	911004	0.2500	0.4629
8			
Semicossyphus pulcher male		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Semicossyphus pulcher female		1.5000	1.2432
12			
	910920	1.0000	0.8165
4			
	911004	1.7500	1.3887
8			
Embiotoca jacksoni adult		0.5000	0.7977
12			
	910920	1.0000	1.1547
4			

	911004	0.2500	0.4629
8			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Embiotoca lateralis adult		0.0833	0.2887
12			
	910920	0.2500	0.5000
4			
	911004	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Damalichthys vacca adult		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910920	0.0000	0.0000
4			
	911004	0.0000	0.0000
8			
Hypsypops rubicundus adult		0.4167	0.5149
12			
	910920	0.5000	0.5774
4			
	911004	0.3750	0.5175
8			
Hypsypops rubicundus juvenile		0.3333	0.4924
12			
	910920	0.2500	0.5000
4			
	911004	0.3750	0.5175
8			
Girella nigricans adult		0.6667	0.6513

LOCATION 9 SANTA CRUZ ISLAND - SCORPION ANCHORAGE 90
12
910920 0.2500 0.5000
4
911004 0.8750 0.6409
8

Girella nigricans juvenile 0.0833 0.2887
12
910920 0.0000 0.0000
4
911004 0.1250 0.3536
8

1991 SIZE FREQUENCY DISTRIBUTIONS

Astraea undosa

(cases) N=	35
< 10	0.0
10 - 19	0.0
20 - 29	2.9%
30 - 39	8.6%
40 - 49	14.3%
50 - 59	5.7%
60 - 69	20.0%
70 - 79	42.9%
80 - 89	2.9%
90 - 99	0.0
100 - 109	0.0
110 - 119	2.9%
> 119	0.0
min size (mm)	24
max size (mm)	112
mean	63
mode	71

Megathura crenulata

(cases) N=	72
< 10	0.0
10 - 19	1.4%
20 - 29	0.0
30 - 39	0.0
40 - 49	2.8%
50 - 59	13.9%
60 - 69	48.6%
70 - 79	29.2%
80 - 89	2.8%
90 - 99	1.4%
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	19
max size (mm)	95
mean	65
mode	71

Hinnites giganteus

(cases) N=	29
< 10	0.0
10 - 19	0.0
20 - 29	10.3%
30 - 39	31.0%
40 - 49	20.7%
50 - 59	17.2%
60 - 69	6.9%
70 - 79	6.9%
80 - 89	0.0
90 - 99	3.4%
100 - 109	3.4%
110 - 119	0.0
120 - 129	0.0
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	24
max size (mm)	100
mean	49
mode	35

Patiria miniata

(cases) N=	65
< 10	1.5%
10 - 19	0.0
20 - 29	9.2%
30 - 39	20.0%
40 - 49	9.2%
50 - 59	12.3%
60 - 69	20.0%
70 - 79	16.9%
80 - 89	10.8%
90 - 99	0.0
> 99	0.0
min size (mm)	7
max size (mm)	88
mean	55
mode	32

Strongylocentrotus purpuratus

(cases) N=	106
< 5	2.8%
5 - 9	.9%
10 - 14	.9%
15 - 19	0.0
20 - 24	2.8%
25 - 29	29.2%
30 - 34	51.9%
35 - 39	10.4%
40 - 44	.9%
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	4
max size (mm)	40
mean	30
mode	30

Strongylocentrotus franciscanus

(cases) N=	107
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	5.6%
30 - 34	13.1%
35 - 39	30.8%
40 - 44	25.2%
45 - 49	10.3%
50 - 54	4.7%
55 - 59	1.9%
60 - 64	5.6%
65 - 69	1.9%
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	.9%
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	25
max size (mm)	96
mean	42
mode	41

Pisaster giganteus

(cases) N=	28
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	0.0
80 - 99	3.6%
100 - 119	7.1%
120 - 139	14.3%
140 - 159	14.3%
160 - 179	14.3%
180 - 199	10.7%
200 - 219	17.9%
220 - 239	10.7%
240 - 259	3.6%
260 - 279	0.0
280 - 299	0.0
> 299	3.6%
min size (mm)	88
max size (mm)	310
mean	176
mode	130

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.1250	0.2751	20
Eisenia arborea	0.0750	0.2447	20
Pterygophora californica	2.2000	3.0796	20
Laminaria farlowii	0.4500	0.4840	20
Macrocystis pyrifera juvenile	0.2500	0.5735	20
Macrocystis pyrifera all	0.3750	0.5821	20
Cypraea spadicea	0.0000	0.0000	20
Astraea undosa	0.6250	1.4498	20
Patiria miniata	0.0500	0.1539	20
Pisaster giganteus	0.2250	0.3432	20
Strongylocentrotus franciscanus	2.2250	5.1643	20
Strongylocentrotus purpuratus	11.4750	13.1524	20
Parastichopus parvimensis	0.8750	0.9301	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.6500	0.8900	20
Alloclinus holderi	0.0000	0.0000	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0056	0.0082	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0014	0.0048	12
Lophogorgia chilensis	0.0931	0.0500	12
Muricea fruticosa	0.0056	0.0148	

12	Muricea californica	0.0125	0.0126
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0042	0.0075
12	Haliotis corrugata	0.0069	0.0086
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0236	0.0219
12	Megathura crenulata	0.0278	0.0217
12	Hinnites giganteus	0.0014	0.0048
12	Aplysia californica	0.0000	0.0000
12	Pycnopodia helianthoides	0.0028	0.0065
12	Lytechinus anamesus	9.0458	9.2056

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	0.1000	0.5000	25
Miscellaneous brown algae	0.8000	2.1311	25
Desmarestia spp.	1.5000	3.7500	25
Laminaria farlowii	3.1000	5.2182	25
Cystoseira spp.	9.1000	6.8420	25
Macrocystis, Eisenia, Pterygophora	18.0000	15.3093	25
Miscellaneous red algae	3.1000	5.3658	25
Articulated coralline algae	20.0000	12.2899	25
Crustose coralline algae	52.3000	18.5815	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	5.4000	6.1101	25
Sponges	1.1000	1.6266	25
Corynactis californica	0.7000	1.5343	25
Balanophyllia elegans	1.3000	2.6141	25
Astrangia lajollaensis	3.3000	2.5739	25
Diopatra ornata	0.6000	1.3070	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.0000	0.0000	25
Bryozoans, other	15.1000	9.8816	25
Diaperoecia californica	5.8000	6.0690	25
Tunicates	1.5000	2.1651	25
Miscellaneous invertebrates	14.2000	10.4013	25
Bare substrate	11.7000	14.3200	

LOCATION 10 SANTA CRUZ ISLAND - YELLOWBANKS 96
25

Rock	76.8000	25.3262

25

Cobble	12.8000	14.7253

25

Sand	10.4000	13.6107

25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	5.7188	20.0608

96

Chromis punctipinnis	47.5000	52.9501

8

Oxyjulis californica	13.7500	16.4208

8

Sebastes mystinus	0.0000	0.0000

8

Sebastes serranoides	0.6250	1.1877

8

Sebastes atrovirens	0.3750	0.7440

8

Paralabrax clathratus	2.3750	3.8522

8

Semicossyphus pulcher	2.5000	3.0237

8

Embiotoca jacksoni	0.6250	0.7440

8

Embiotoca lateralis	0.0000	0.0000

8

Damalichthys vacca	0.2500	0.4629

8

Hypsypops rubicundus	0.1250	0.3536

8

Girella nigricans	0.5000	0.5345

8

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/date)	Mean	Std Dev	Cases
Chromis punctipinnis	adult	47.5000	52.9501	8
	910826	1.5000	2.3805	4
	911017	93.5000	29.8943	4
Chromis punctipinnis	juvenile	0.0000	0.0000	8
	910826	0.0000	0.0000	4
	911017	0.0000	0.0000	4
Oxyjulis californica	adult	13.7500	16.4208	8
	910826	7.2500	10.0125	4
	911017	20.2500	20.4022	4
Oxyjulis californica	juvenile	0.0000	0.0000	8
	910826	0.0000	0.0000	4
	911017	0.0000	0.0000	4
Sebastes mystinus	adult	0.0000	0.0000	8
	910826	0.0000	0.0000	4
	911017	0.0000	0.0000	4
Sebastes mystinus	juvenile	0.0000	0.0000	8
	910826	0.0000	0.0000	4
	911017	0.0000	0.0000	4
Sebastes serranoides	adult	0.0000	0.0000	8
	910826	0.0000	0.0000	4
	911017	0.0000	0.0000	4

Sebastes serranoides juvenile		0.6250	1.1877
8			
	910826	1.2500	1.5000
4			
	911017	0.0000	0.0000
4			
Sebastes atrovirens adult		0.3750	0.7440
8			
	910826	0.0000	0.0000
4			
	911017	0.7500	0.9574
4			
Sebastes atrovirens juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Paralabrax clathratus adult		2.3750	3.8522
8			
	910826	0.2500	0.5000
4			
	911017	4.5000	4.7258
4			
Paralabrax clathratus juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Semicossyphus pulcher male		0.2500	0.4629
8			
	910826	0.0000	0.0000
4			
	911017	0.5000	0.5774
4			
Semicossyphus pulcher female		2.2500	2.6049
8			
	910826	0.7500	0.5000
4			
	911017	3.7500	3.0957
4			
Embiotoca jacksoni adult		0.6250	0.7440
8			
	910826	0.2500	0.5000
4			
	911017	1.0000	0.8165

4			
Embiotoca jacksoni juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Embiotoca lateralis adult		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Embiotoca lateralis juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Damalichthys vacca adult		0.2500	0.4629
8			
	910826	0.2500	0.5000
4			
	911017	0.2500	0.5000
4			
Damalichthys vacca juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Hypsypops rubicundus adult		0.1250	0.3536
8			
	910826	0.0000	0.0000
4			
	911017	0.2500	0.5000
4			
Hypsypops rubicundus juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			
Girella nigricans adult		0.5000	0.5345
8			

LOCATION 10 SANTA CRUZ ISLAND - YELLOWBANKS 100

	910826	0.0000	0.0000
4			
	911017	1.0000	0.0000
4			
Girella nigricans juvenile		0.0000	0.0000
8			
	910826	0.0000	0.0000
4			
	911017	0.0000	0.0000
4			

1991 SIZE FREQUENCY DISTRIBUTIONS

Haliotis corrugata

(cases) N=	25
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
110 - 114	4.0%
115 - 119	8.0%
120 - 124	16.0%
125 - 129	4.0%
130 - 134	20.0%
135 - 139	24.0%
140 - 144	8.0%
145 - 149	16.0%
150 - 154	0.0
155 - 159	0.0
160 - 164	0.0
165 - 169	0.0
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	112
max size (mm)	148
mean	133
mode	124

Kelletia kelletii

(cases) N=	39
< 40	0.0
40 - 49	0.0
50 - 59	0.0
60 - 69	2.6%
70 - 79	2.6%
80 - 89	0.0
90 - 99	30.8%
100 - 109	30.8%
110 - 119	28.2%
120 - 129	5.1%
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	61
max size (mm)	121
mean	103
mode	97

Astraea undosa

(cases) N=	31
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	3.2%
40 - 49	3.2%
50 - 59	6.5%
60 - 69	0.0
70 - 79	16.1%
80 - 89	6.5%
90 - 99	32.3%
100 - 109	9.7%
110 - 119	12.9%
> 119	6.5%
min size (mm)	36
max size (mm)	128
mean	91
mode	78

Patiria miniata

(cases) N=	49
< 10	2.0%
10 - 19	4.1%
20 - 29	12.2%
30 - 39	18.4%
40 - 49	24.5%
50 - 59	12.2%
60 - 69	6.1%
70 - 79	4.1%
80 - 89	16.3%
90 - 99	0.0
> 99	0.0
min size (mm)	7
max size (mm)	88
mean	48
mode	40

Lytechinus anamesus

(cases) N=	168
< 5	0.0
5 - 9	1.2%
10 - 14	7.7%
15 - 19	19.0%
20 - 24	47.6%
25 - 29	22.0%
30 - 34	2.4%
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
> 49	0.0
min size (mm)	7
max size (mm)	32
mean	21
mode	20

Megathura crenulata

(cases) N=	22
< 10	0.0
10 - 19	4.5%
20 - 29	4.5%
30 - 39	4.5%
40 - 49	0.0
50 - 59	0.0
60 - 69	18.2%
70 - 79	50.0%
80 - 89	13.6%
90 - 99	4.5%
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	15
max size (mm)	91
mean	68
mode	68

Pisaster giganteus

(cases) N=	33
< 20	0.0
20 - 39	3.0%
40 - 59	27.3%
60 - 79	51.5%
80 - 99	12.1%
100 - 119	3.0%
120 - 139	0.0
140 - 159	3.0%
160 - 179	0.0
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	27
max size (mm)	155
mean	69
mode	50

Strongylocentrotus purpuratus

(cases) N=	105
< 5	0.0
5 - 9	5.7%
10 - 14	2.9%
15 - 19	2.9%
20 - 24	11.4%
25 - 29	14.3%
30 - 34	22.9%
35 - 39	17.1%
40 - 44	8.6%
45 - 49	8.6%
50 - 54	4.8%
55 - 59	1.0%
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	5
max size (mm)	58
mean	32
mode	31

Strongylocentrotus franciscanus

(cases) N=	128
< 5	0.0
5 - 9	3.1%
10 - 14	8.6%
15 - 19	3.9%
20 - 24	3.9%
25 - 29	3.9%
30 - 34	3.9%
35 - 39	1.6%
40 - 44	3.1%
45 - 49	3.9%
50 - 54	2.3%
55 - 59	7.0%
60 - 64	10.2%
65 - 69	8.6%
70 - 74	14.8%
75 - 79	5.5%
80 - 84	4.7%
85 - 90	4.7%
90 - 94	2.3%
95 - 99	.8%
100 - 104	.8%
105 - 109	.8%
> 109	1.6%
min size (mm)	6
max size (mm)	135
mean	56
mode	63

Macrocystis pyrifera numbers of stipes.

(cases) N=	103
< 3	5.8%
3 - 5	9.7%
6 -8	13.6%
9 -11	20.4%
12 - 14	12.6%
15 - 17	8.7%
18 - 20	9.7%
21 - 23	7.8%
24 - 26	5.8%
27 - 29	2.9%
30 - 32	0.0
33 - 35	2.9%
36 - 38	0.0
39 - 41	0.0
42 - 44	0.0
>44	0.0
min number	1
max number	34
mean	13
mode	6

Macrocystis pyrifera holdfast diameters.

(cases) N=	103
< 6	1.0%
6 - 11	2.9%
12 - 17	8.7%
18 - 23	15.5%
24 - 29	30.1%
30 - 35	14.6%
36 - 41	9.7%
42 - 47	9.7%
48 - 53	4.9%
54 - 59	1.9%
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	1.0%
min width (cm)	5
mean	31
mode	28

Lophogorgia chilensis heights.

(cases) N=	68
< 5	0.0
5 - 8	1.5%
9 - 12	8.8%
13 - 16	16.2%
17 - 20	19.1%
21 - 24	13.2%
25 - 28	19.1%
29 - 32	11.8%
33 - 36	7.4%
37 - 40	2.9%
>41	0.0
min height (cm)	6
max height (cm)	38
mean	22
mode	18

Lophogorgia chilensis widths.

(cases) N=	68
< 5	2.9%
5 - 8	13.2%
9 - 12	17.6%
13 - 16	20.6%
17 - 20	29.4%
21 - 24	10.3%
25 - 28	2.9%
29 - 32	2.9%
33 - 36	0.0
37 - 40	0.0
>41	0.0
min width (cm)	4
max width (cm)	32
mean	15
mode	17

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.2250	0.3796	20
Eisenia arborea	0.5750	0.8472	20
Pterygophora californica	0.0250	0.1118	20
Laminaria farlowii	0.2250	0.4993	20
Macrocystis pyrifera juvenile	0.1000	0.2616	20
Macrocystis pyrifera all	0.3250	0.4064	20
Cypraea spadicea	0.0500	0.1539	20
Astraea undosa	0.0250	0.1118	20
Patiria miniata	0.4500	0.7237	20
Pisaster giganteus	0.1250	0.3193	20
Strongylocentrotus franciscanus	3.2250	2.9086	20
Strongylocentrotus purpuratus	7.9250	4.6120	20
Parastichopus parvimensis	1.8750	1.1107	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0750	0.1832	20
Coryphopterus nicholsii	1.4000	1.1539	20
Alloclinus holderi	0.3750	0.3932	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0014	0.0048	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.1056	0.0434	12
Muricea fruticosa	0.0181	0.0288	

12	Muricea californica	0.0292	0.0257
12	Panulirus interruptus	0.0000	0.0000
12	Haliotis rufescens	0.0000	0.0000
12	Haliotis corrugata	0.0083	0.0112
12	Haliotis fulgens	0.0000	0.0000
12	Kelletia kelletii	0.0014	0.0048
12	Megathura crenulata	0.0056	0.0109
12	Hinnites giganteus	0.0583	0.0548
12	Aplysia californica	0.0014	0.0048
12	Pycnopodia helianthoides	0.0000	0.0000
12	Lytechinus anamesus	4.8792	6.9997

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.1000	2.2913	25
Miscellaneous brown algae	7.9000	6.9101	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	1.8000	4.0517	25
Cystoseira spp.	11.2000	12.9526	25
Macrocystis, *Eisenia*, *Pterygophora*	10.4000	16.4678	25
Miscellaneous red algae	24.5000	15.6957	25
Articulated coralline algae	4.4000	5.2182	25
Crustose coralline algae	44.9000	19.4117	25
Gelidium spp.	0.2000	0.6922	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	5.1000	6.3525	25
Sponges	5.2000	6.7670	25
Corynactis californica	0.9000	2.5900	25
Balanophyllia elegans	1.1000	2.8025	25
Astrangia lajollaensis	4.9000	5.0249	25
Diopatra ornata	0.4000	1.5612	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	1.4000	2.0514	25
Bryozoans, other	11.5000	9.4923	25
Diaperoecia californica	2.1000	3.9974	25
Tunicates	1.2000	2.4066	25
Miscellaneous invertebrates	21.0000	15.4448	25
Bare substrate	10.2000	13.7105	25
Rock	80.6000	23.6322	

Cobble	12.0000	15.0174	25
Sand	7.4000	10.9801	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	20.0347	70.7486	144
Chromis punctipinnis	213.2500	142.2898	12
Oxyjulis californica	14.5833	13.4263	12
Sebastes mystinus	2.5000	2.9388	12
Sebastes serranoides	0.0000	0.0000	12
Sebastes atrovirens	0.0833	0.2887	12
Paralabrax clathratus	3.0833	2.4293	12
Semicossyphus pulcher	2.3333	1.5570	12
Embiotoca jacksoni	0.5000	0.5222	12
Embiotoca lateralis	0.0000	0.0000	12
Damalichthys vacca	0.9167	1.9752	12
Hypsypops rubicundus	1.0000	0.9535	12
Girella nigricans	2.1667	1.8007	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		62.9167	41.7252	12
	910726	62.6250	38.7296	8
	910919	63.5000	53.6936	4
Chromis punctipinnis juvenile		150.3333	138.0740	12
	910726	186.7500	154.3676	

8			
	910919	77.5000	60.7591
4			
Oxyjulis californica adult		11.0000	11.4574
12			
	910726	5.6250	4.4058
8			
	910919	21.7500	14.3149
4			
Oxyjulis californica juvenile		3.5833	6.6805
12			
	910726	4.8750	7.9720
8			
	910919	1.0000	1.4142
4			
Sebastes mystinus adult		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Sebastes mystinus juvenile		2.5000	2.9388
12			
	910726	2.7500	3.4949
8			
	910919	2.0000	1.6330
4			
Sebastes serranoides adult		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Sebastes serranoides juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Sebastes atrovirens adult		0.0833	0.2887
12			
	910726	0.0000	0.0000
8			
	910919	0.2500	0.5000
4			

Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Paralabrax clathratus adult		2.0000	1.4142
12			
	910726	2.6250	1.3025
8			
	910919	0.7500	0.5000
4			

Paralabrax clathratus juvenile		1.0833	1.5050
12			
	910726	1.6250	1.5980
8			
	910919	0.0000	0.0000
4			
Semicossyphus pulcher male		0.4167	0.6686
12			
	910726	0.2500	0.4629
8			
	910919	0.7500	0.9574
4			
Semicossyphus pulcher female		1.9167	1.3114
12			
	910726	2.0000	1.5119
8			
	910919	1.7500	0.9574
4			
Embiotoca jacksoni adult		0.5000	0.5222
12			
	910726	0.5000	0.5345
8			
	910919	0.5000	0.5774
4			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Damalichthys vacca adult		0.2500	0.4523
12			
	910726	0.2500	0.4629
8			

	910919	0.2500	0.5000
4			
Damalichthys vacca juvenile		0.6667	1.7233
12			
	910726	1.0000	2.0702
8			
	910919	0.0000	0.0000
4			
Hypsypops rubicundus adult		1.0000	0.9535
12			
	910726	0.5000	0.5345
8			
	910919	2.0000	0.8165
4			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			
Girella nigricans adult		2.1667	1.8007
12			
	910726	2.8750	1.7269
8			
	910919	0.7500	0.9574
4			
Girella nigricans juvenile		0.0000	0.0000
12			
	910726	0.0000	0.0000
8			
	910919	0.0000	0.0000
4			

1991 SIZE FREQUENCY DISTRIBUTIONS

Haliotis corrugata

(cases) N=	33	90 - 94	0.0
< 25	0.0	95 - 99	3.0%
25 - 29	0.0	100 - 104	6.1%
30 - 34	0.0	105 - 109	9.1%
35 - 39	0.0	110 - 114	3.0%
40 - 44	0.0	115 - 119	6.1%
45 - 49	0.0	120 - 124	12.1%
50 - 54	0.0	125 - 129	21.2%
55 - 59	0.0	130 - 134	9.1%
60 - 64	0.0	135 - 139	9.1%
65 - 69	0.0	140 - 144	6.1%
70 - 74	3.0%	145 - 149	3.0%
75 - 79	0.0	150 - 154	3.0%
80 - 84	3.0%	155 - 159	3.0%
85 - 90	0.0	160 - 164	0.0
		165 - 169	0.0
		170 - 174	0.0
		175 - 179	0.0
		180 - 184	0.0
		185 - 189	0.0

190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	70
max size (mm)	156
mean	122
mode	127

Patiria miniata

(cases) N=	82
< 10	2.4%
10 - 19	6.1%
20 - 29	2.4%
30 - 39	4.9%
40 - 49	12.2%
50 - 59	17.1%
60 - 69	34.1%
70 - 79	13.4%
80 - 89	6.1%
90 - 99	1.2%
> 99	0.0
min size (mm)	6
max size (mm)	90
mean	56
mode	67

Megathura crenulata

(cases) N=	11
< 10	0.0
10 - 19	45.5%
20 - 29	0.0
30 - 39	0.0
40 - 49	9.1%
50 - 59	9.1%
60 - 69	9.1%
70 - 79	9.1%
80 - 89	0.0
90 - 99	9.1%
100 - 109	0.0
110 - 119	9.1%
> 119	0.0
min size (mm)	13
max size (mm)	114
mean	47
mode	13

Hinnites giganteus

(cases) N=	62
< 10	0.0
10 - 19	1.6%
20 - 29	0.0
30 - 39	12.9%
40 - 49	16.1%
50 - 59	22.6%
60 - 69	12.9%
70 - 79	11.3%
80 - 89	12.9%
90 - 99	3.2%
100 - 109	0.0
110 - 119	3.2%
120 - 129	3.2%
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	15
max size (mm)	124
mean	63
mode	46

Pisaster giganteus

(cases) N=	19
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	0.0
80 - 99	0.0
100 - 119	36.8%
120 - 139	26.3%
140 - 159	15.8%
160 - 179	15.8%
180 - 199	0.0
200 - 219	5.3%
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	110
max size (mm)	200
mean	136
mode	111

Lytechinus anamesus

(cases) N=	141
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	4.3%
20 - 24	12.1%
25 - 29	36.9%
30 - 34	43.3%
35 - 39	2.8%
40 - 44	.7%
45 - 49	0.0
> 49	0.0
min size (mm)	17
max size (mm)	40
mean	28
mode	30

Strongylocentrotus franciscanus

(cases) N=	101
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	2.0%
40 - 44	0.0
45 - 49	0.0
50 - 54	1.0%
55 - 59	5.9%
60 - 64	7.9%
65 - 69	5.9%
70 - 74	18.8%
75 - 79	14.9%
80 - 84	7.9%
85 - 90	14.9%
90 - 94	8.9%
95 - 99	5.9%
100 - 104	5.0%
105 - 109	1.0%
> 109	0.0
min size (mm)	35
max size (mm)	109
mean	78
mode	70

Strongylocentrotus purpuratus

(cases) N=	100
< 5	0.0
5 - 9	2.0%
10 - 14	2.0%
15 - 19	8.0%
20 - 24	8.0%
25 - 29	17.0%
30 - 34	13.0%
35 - 39	14.0%
40 - 44	18.0%
45 - 49	4.0%
50 - 54	8.0%
55 - 59	3.0%
60 - 64	2.0%
65 - 69	0.0
70 - 74	1.0%
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	5
max size (mm)	72
mean	35
mode	44

Macrocystis pyrifera numbers of stipes

(cases) N=	68
< 3	0.0
3 - 5	11.8%
6 -8	11.8%
9 -11	14.7%
12 - 14	7.4%
15 - 17	8.8%
18 - 20	8.8%
21 - 23	1.5%
24 - 26	8.8%
27 - 29	5.9%
30 - 32	4.4%
33 - 35	5.9%
36 - 38	1.5%
39 - 41	5.9%
42 - 44	0.0
>44	1.5%
min number	3
max number	56
mean	19
mode	5

Macrocystis pyrifera holdfast diameters

(cases) N=	68
< 6	0.0
6 - 11	0.0
12 - 17	1.5%
18 - 23	5.9%
24 - 29	16.2%
30 - 35	19.1%
36 - 41	19.1%
42 - 47	17.6%
48 - 53	7.4%
54 - 59	7.4%
60 - 65	4.4%
66 - 71	0.0
72 - 77	0.0
78 - 83	1.5%
84 - 89	0.0
>89	0.0
min width (cm)	13
max width (cm)	82
mean	39
mode	28

Lophogorgia chilensis heights

(cases) N=	32
< 5	0.0
5 - 8	0.0
9 - 12	3.1%
13 - 16	0.0
17 - 20	3.1%
21 - 24	9.4%
25 - 28	3.1%
29 - 32	18.8%
33 - 36	6.3%
37 - 40	18.8%
41 - 44	9.4%
45 - 48	6.3%
49 - 52	0.0
53 - 56	0.0
57 - 60	3.1%
61 - 64	3.1%
65 - 68	6.3%
69 - 72	0.0
73 - 76	6.3%
77 - 80	0.0
81 - 84	0.0
85 - 88	0.0
89 - 92	3.1%
93 - 96	0.0
97 - 100	0.0
>100	0.0
min height (cm)	11
max height (cm)	92
mean	41
mode	24

Lophogorgia chilensis widths

(cases) N=	32
< 5	0.0
5 - 8	0.0
9 - 12	3.1%
13 - 16	0.0
17 - 20	15.6%
21 - 24	18.8%
25 - 28	6.3%
29 - 32	9.4%
33 - 36	9.4%
37 - 40	9.4%
41 - 44	3.1%
45 - 48	3.1%
49 - 52	3.1%
53 - 56	3.1%
57 - 60	0.0
61 - 64	3.1%
65 - 68	3.1%
69 - 72	3.1%
73 - 76	3.1%
77 - 80	0.0
81 - 84	0.0
85 - 88	3.1%
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min width (cm)	9
max width (cm)	86
mean	36
mode	24

Muricea fruticosa heights

(cases) N=	27
< 5	0.0
5 - 8	0.0
9 - 12	7.4%
13 - 16	11.1%
17 - 20	25.9%
21 - 24	14.8%
25 - 28	29.6%
29 - 32	11.1%
33 - 36	0.0
37 - 40	0.0
41 - 44	0.0
45 - 48	0.0
49 - 52	0.0
53 - 56	0.0
57 - 60	0.0
>60	0.0
min height (cm)	10
max height (cm)	32
mean	22
mode	20

Muricea fruticosa widths

(cases) N=	27
< 5	0.0
5 - 8	0.0
9 - 12	0.0
13 - 16	0.0
17 - 20	0.0
21 - 24	11.1%
25 - 28	22.2%
29 - 32	22.2%
33 - 36	14.8%
37 - 40	18.5%
41 - 44	7.4%
45 - 48	0.0
49 - 52	3.7%
53 - 56	0.0
57 - 60	0.0
>60	0.0
min width (cm)	21
max width (cm)	52
mean	33
mode	30

Muricea californica heights

(cases) N=	42
< 5	0.0
5 - 8	0.0
9 - 12	0.0
13 - 16	0.0
17 - 20	0.0
21 - 24	0.0
25 - 28	7.1%
29 - 32	7.1%
33 - 36	7.1%
37 - 40	4.8%
41 - 44	7.1%
45 - 48	16.7%
49 - 52	11.9%
53 - 56	9.5%
57 - 60	2.4%
61 - 64	9.5%
65 - 68	2.4%
69 - 72	4.8%
73 - 76	2.4%
77 - 80	2.4%
81 - 84	4.8%
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min height (cm)	25
max height (cm)	83
mean	50
mode	45

Muricea californica widths

(cases) N=	42
< 5	0.0
5 - 8	0.0
9 - 12	0.0
13 - 16	0.0
17 - 20	0.0
21 - 24	0.0
25 - 28	7.1%
29 - 32	2.4%
33 - 36	2.4%
37 - 40	0.0
41 - 44	2.4%
45 - 48	4.8%
49 - 52	4.8%
53 - 56	4.8%
57 - 60	7.1%
61 - 64	7.1%
65 - 68	0.0
69 - 72	11.9%
73 - 76	2.4%
77 - 80	9.5%
81 - 84	2.4%
85 - 88	11.9%
89 - 92	0.0
93 - 96	4.8%
97 - 100	4.8%
>100	9.5%
min width (cm)	25
max width (cm)	140
mean	71
mode	25

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.3500	0.6304	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0250	0.1118	20
Macrocystis pyrifera juvenile	0.1750	0.4667	20
Macrocystis pyrifera all	0.5250	0.9525	20
Cypraea spadicea	0.0250	0.1118	20
Astraea undosa	1.6500	1.2258	20
Patiria miniata	0.0250	0.1118	20
Pisaster giganteus	0.0000	0.0000	20
Strongylocentrotus franciscanus	4.1250	2.3724	20
Strongylocentrotus purpuratus	0.6000	1.1877	20
Parastichopus parvimensis	0.6250	0.7232	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.6000	0.6407	20
Alloclinus holderi	0.0750	0.2447	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0000	0.0000	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0000	0.0000	12

	Muricea fruticosa	0.0000	0.0000
12			
	Muricea californica	0.0000	0.0000
12			
	Panulirus interruptus	0.0472	0.1532
12			
	Haliotis rufescens	0.0000	0.0000
12			
	Haliotis corrugata	0.0125	0.0161
12			
	Haliotis fulgens	0.0014	0.0048
12			
	Kelletia kelletii	0.0028	0.0065
12			
	Megathura crenulata	0.0222	0.0320
12			
	Hinnites giganteus	0.1181	0.1319
12			
	Aplysia californica	0.0139	0.0172
12			
	Pycnopodia helianthoides	0.0000	0.0000
12			
	Lytechinus anamesus	0.0000	0.0000
12			

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.5000	2.9756	25
Miscellaneous brown algae	7.4000	9.1708	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.8000	4.0000	25
Cystoseira spp.	4.2000	6.0690	25
Macrocystis, Eisenia, Pterygophora	19.7000	19.1393	25
Miscellaneous red algae	2.7000	4.0130	25
Articulated coralline algae	14.3000	8.3392	25
Crustose coralline algae	33.0000	10.8253	25
Gelidium spp.	0.6000	1.3070	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	2.2000	2.7310	25
Sponges	2.0000	3.8864	25
Corynactis californica	0.0000	0.0000	25
Balanophyllia elegans	0.1000	0.5000	25
Astrangia lajollaensis	1.9000	2.0767	25
Diopatra ornata	0.7000	1.8428	25
Phragmatopoma californica	0.4000	1.5612	25
Serpulorbis squamigerus	2.4000	2.1016	25
Bryozoans, other	3.6000	4.3349	25
Diaperoecia californica	1.6000	3.5998	25
Tunicates	3.7000	3.4701	25
Miscellaneous invertebrates	15.1000	8.6144	25
Bare substrate	35.2000	15.9739	25
Rock	65.3000	23.0186	

25	Cobble	9.7000	9.2792
25	Sand	25.0000	18.2717
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	15.1181	47.6461
144			
	Chromis punctipinnis	152.0000	84.0476
12			
	Oxyjulis californica	2.7500	1.7123
12			
	Sebastes mystinus	0.2500	0.4523
12			
	Sebastes serranoides	3.3333	1.6143
12			
	Sebastes atrovirens	0.2500	0.4523
12			
	Paralabrax clathratus	9.7500	5.6428
12			
	Semicossyphus pulcher	4.9167	2.2747
12			
	Embiotoca jacksoni	1.3333	1.2309
12			
	Embiotoca lateralis	0.0000	0.0000
12			
	Damalichthys vacca	0.1667	0.5774
12			
	Hypsypops rubicundus	2.6667	1.4975
12			
	Girella nigricans	4.0000	3.2753
12			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		104.0833	91.9540	12
	910808	40.0000	33.6551	4
	910829	136.1250	96.3423	8
Chromis punctipinnis juvenile		47.9167	71.8122	12
	910808	36.5000	16.7033	4
	910829	53.6250	88.7274	8
Oxyjulis californica adult		2.5833	1.6765	12
	910808	1.7500	0.5000	4
	910829	3.0000	1.9272	8
Oxyjulis californica juvenile		0.1667	0.3892	12
	910808	0.2500	0.5000	4
	910829	0.1250	0.3536	8
Sebastes mystinus adult		0.0000	0.0000	12
	910808	0.0000	0.0000	4
	910829	0.0000	0.0000	8
Sebastes mystinus juvenile		0.2500	0.4523	12
	910808	0.0000	0.0000	4
	910829	0.3750	0.5175	8
Sebastes serranoides adult		0.0000	0.0000	12
	910808	0.0000	0.0000	4
	910829	0.0000	0.0000	8

Sebastes serranoides juvenile		3.3333	1.6143
12			
	910808	4.0000	1.4142
4			
	910829	3.0000	1.6903
8			
Sebastes atrovirens adult		0.2500	0.4523
12			
	910808	0.0000	0.0000
4			
	910829	0.3750	0.5175
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910808	0.0000	0.0000
4			
	910829	0.0000	0.0000
8			
Paralabrax clathratus adult		8.2500	4.4133
12			
	910808	3.7500	0.9574
4			
	910829	10.5000	3.5857
8			
Paralabrax clathratus juvenile		1.5000	1.8340
12			
	910808	0.7500	0.5000
4			
	910829	1.8750	2.1671
8			
Semicossyphus pulcher male		0.9167	0.9003
12			
	910808	0.0000	0.0000
4			
	910829	1.3750	0.7440
8			
Semicossyphus pulcher female		4.0000	1.8586
12			
	910808	3.0000	1.8257
4			
	910829	4.5000	1.7728
8			
Embiotoca jacksoni adult		1.0833	1.0836
12			
	910808	1.0000	0.8165
4			
	910829	1.1250	1.2464

Embiotoca jacksoni juvenile		0.2500	0.4523
12			
	910808	0.0000	0.0000
4			
	910829	0.3750	0.5175
8			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910808	0.0000	0.0000
4			
	910829	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910808	0.0000	0.0000
4			
	910829	0.0000	0.0000
8			
Damalichthys vacca adult		0.1667	0.5774
12			
	910808	0.0000	0.0000
4			
	910829	0.2500	0.7071
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910808	0.0000	0.0000
4			
	910829	0.0000	0.0000
8			
Hypsypops rubicundus adult		2.5000	1.4460
12			
	910808	2.5000	1.2910
4			
	910829	2.5000	1.6036
8			
Hypsypops rubicundus juvenile		0.1667	0.3892
12			
	910808	0.0000	0.0000
4			
	910829	0.2500	0.4629
8			
Girella nigricans adult		4.0000	3.2753
12			

	910808	6.0000	4.2426
4			
	910829	3.0000	2.3905
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910808	0.0000	0.0000
4			
	910829	0.0000	0.0000
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Haliotis corrugata

(cases) N=	29
< 25	17.2%
25 - 29	0.0
30 - 34	0.0
35 - 39	3.4%
40 - 44	3.4%
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
110 - 114	3.4%
115 - 119	0.0
120 - 124	0.0
125 - 129	13.8%
130 - 134	10.3%
135 - 139	10.3%
140 - 144	20.7%
145 - 149	6.9%
150 - 154	3.4%
155 - 159	6.9%
160 - 164	0.0
165 - 169	0.0
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	10
max size (mm)	157
mean	110
mode	21

Patiria miniata

(cases) N=	88
< 10	67.0%
10 - 19	26.1%
20 - 29	3.4%
30 - 39	1.1%
40 - 49	2.3%
50 - 59	0.0
60 - 69	0.0
70 - 79	0.0
80 - 89	0.0
90 - 99	0.0
> 99	0.0
min size (mm)	2
max size (mm)	42
mean	9
mode	7

Astraea undosa

(cases) N=	81
< 10	0.0
10 - 19	0.0
20 - 29	2.5%
30 - 39	4.9%
40 - 49	4.9%
50 - 59	4.9%
60 - 69	12.3%
70 - 79	29.6%
80 - 89	35.8%
90 - 99	3.7%
100 - 109	1.2%
110 - 119	0.0
> 119	0.0
min size (mm)	28
max size (mm)	107
mean	72
mode	80

Hinnites giganteus

(cases) N=	56
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	1.8%
40 - 49	5.4%
50 - 59	17.9%
60 - 69	21.4%
70 - 79	21.4%
80 - 89	19.6%
90 - 99	5.4%
100 - 109	5.4%
110 - 119	1.8%
120 - 129	0.0
130 - 139	0.0
140 - 149	0.0
> 149	0.0
min size (mm)	36
max size (mm)	111
mean	72
mode	67

Strongylocentrotus franciscanus

(cases) N=	102
< 5	0.0
5 - 9	0.0
10 - 14	3.9%
15 - 19	2.0%
20 - 24	2.0%
25 - 29	3.9%
30 - 34	0.0
35 - 39	2.0%
40 - 44	1.0%
45 - 49	1.0%
50 - 54	3.9%
55 - 59	2.9%
60 - 64	2.9%
65 - 69	3.9%
70 - 74	1.0%
75 - 79	2.9%
80 - 84	2.9%
85 - 90	10.8%
90 - 94	9.8%
95 - 99	11.8%
100 - 104	12.7%
105 - 109	7.8%
> 109	6.9%
min size (mm)	11
max size (mm)	117
mean	81
mode	89

Strongylocentrotus purpuratus

(cases) N=	100
< 5	1.0%
5 - 9	5.0%
10 - 14	3.0%
15 - 19	5.0%
20 - 24	6.0%
25 - 29	7.0%
30 - 34	12.0%
35 - 39	18.0%
40 - 44	21.0%
45 - 49	14.0%
50 - 54	5.0%
55 - 59	3.0%
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	4
max size (mm)	58
mean	35
mode	41

Macrocystis pyrifera numbers of stipes.

(cases) N=	125
< 3	43.2%
3 - 5	12.8%
6 -8	10.4%
9 -11	7.2%
12 - 14	7.2%
15 - 17	1.6%
18 - 20	3.2%
21 - 23	2.4%
24 - 26	.8%
27 - 29	.8%
30 - 32	4.0%
33 - 35	.8%
36 - 38	3.2%
39 - 41	.8%
42 - 44	0.0
>44	1.6%
min number	1
max number	137
mean	10
mode	2

Macrocystis pyrifera holdfast diameters.

(cases) N=	125
< 6	15.2%
6 - 11	37.6%
12 - 17	16.0%
18 - 23	11.2%
24 - 29	4.0%
30 - 35	9.6%
36 - 41	3.2%
42 - 47	1.6%
48 - 53	.8%
54 - 59	.8%
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	2
max width (cm)	56
mean	15
mode	8

LOCATION 13 ANACAPA ISLAND - LANDING COVE

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.3750	0.6463	20
Eisenia arborea	1.8250	2.2140	20
Pterygophora californica	0.1250	0.3582	20
Laminaria farlowii	4.5500	5.5581	20
Macrocystis pyrifera juvenile	1.6000	2.2630	20
Macrocystis pyrifera all	1.9750	2.7313	20
Cypraea spadicea	0.0750	0.2447	20
Astraea undosa	0.0500	0.1539	20
Patiria miniata	0.0000	0.0000	20
Pisaster giganteus	0.0000	0.0000	20
Strongylocentrotus franciscanus	3.6250	3.9299	20
Strongylocentrotus purpuratus	2.9500	2.7999	20
Parastichopus parvimensis	0.1000	0.2052	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.3750	0.6859	20
Alloclinus holderi	0.1500	0.3285	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0028	0.0065	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0028	0.0065	12

	Muricea fruticosa	0.0000	0.0000
12			
	Muricea californica	0.0000	0.0000
12			
	Panulirus interruptus	0.0181	0.0329
12			
	Haliotis rufescens	0.0000	0.0000
12			
	Haliotis corrugata	0.0319	0.0668
12			
	Haliotis fulgens	0.0000	0.0000
12			
	Kelletia kelletii	0.0028	0.0065
12			
	Megathura crenulata	0.0125	0.0203
12			
	Hinnites giganteus	0.5139	0.2664
12			
	Aplysia californica	0.0042	0.0144
12			
	Pycnopodia helianthoides	0.0000	0.0000
12			
	Lytechinus anamesus	0.0000	0.0000
12			

LOCATION 13 ANACAPA ISLAND - LANDING COVE
1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.6000	3.3758	25
Miscellaneous brown algae	2.1000	4.6030	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	18.6000	24.0559	25
Cystoseira spp.	5.3000	7.9162	25
Macrocystis, Eisenia, Pterygophora	49.1000	29.2963	25
Miscellaneous red algae	12.5000	15.3433	25
Articulated coralline algae	21.4000	12.2916	25
Crustose coralline algae	35.4000	19.6543	25
Gelidium spp.	17.9000	27.0289	25
Gigartina spp.	0.4000	1.5612	25
Miscellaneous plants	1.6000	3.1358	25
Sponges	7.8000	8.3329	25
Corynactis californica	2.0000	3.8188	25
Balanophyllia elegans	0.0000	0.0000	25
Astrangia lajollaensis	2.5000	3.7500	25
Diopatra ornata	0.0000	0.0000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	1.5000	1.7678	25
Bryozoans, other	11.6000	12.4975	25
Diaperoecia californica	3.2000	4.9749	25
Tunicates	2.0000	2.7951	25
Miscellaneous invertebrates	12.7000	11.7465	25
Bare substrate	21.4000	24.6864	25

	Rock	75.6000	27.1596
25			
	Cobble	12.3000	12.9888
25			
	Sand	12.1000	19.8127
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	8.8264	26.0554
144			
	Chromis punctipinnis	79.0000	53.0591
12			
	Oxyjulis californica	1.2500	1.4222
12			
	Sebastes mystinus	0.0000	0.0000
12			
	Sebastes serranoides	7.5833	5.8381
12			
	Sebastes atrovirens	0.2500	0.4523
12			
	Paralabrax clathratus	3.5833	1.9752
12			
	Semicossyphus pulcher	1.5833	1.5050
12			
	Embiotoca jacksoni	1.4167	1.0836
12			
	Embiotoca lateralis	0.0000	0.0000
12			
	Damalichthys vacca	0.0000	0.0000
12			
	Hypsypops rubicundus	4.9167	1.6765
12			
	Girella nigricans	6.3333	4.6580
12			

LOCATION 13 ANACAPA ISLAND - LANDING COVE
1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		22.5833	32.8286	12
	910809	6.8750	10.3294	8
	910930	54.0000	41.5772	4
Chromis punctipinnis juvenile		56.4167	62.2699	12
	910809	80.6250	63.6282	8
	910930	8.0000	9.0921	4
Oxyjulis californica adult		1.0000	1.2792	12
	910809	1.3750	1.4079	8
	910930	0.2500	0.5000	4
Oxyjulis californica juvenile		0.2500	0.4523	12
	910809	0.3750	0.5175	8
	910930	0.0000	0.0000	4
Sebastes mystinus adult		0.0000	0.0000	12
	910809	0.0000	0.0000	8
	910930	0.0000	0.0000	4
Sebastes mystinus juvenile		0.0000	0.0000	12
	910809	0.0000	0.0000	8
	910930	0.0000	0.0000	4
Sebastes serranoides adult		0.0000	0.0000	12
	910809	0.0000	0.0000	8
	910930	0.0000	0.0000	4

Sebastes serranoides juvenile		7.5833	5.8381
12			
	910809	11.2500	2.7124
8			
	910930	0.2500	0.5000
4			
Sebastes atrovirens adult		0.2500	0.4523
12			
	910809	0.3750	0.5175
8			
	910930	0.0000	0.0000
4			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Paralabrax clathratus adult		2.8333	2.1249
12			
	910809	2.1250	0.9910
8			
	910930	4.2500	3.2016
4			
Paralabrax clathratus juvenile		0.7500	1.2154
12			
	910809	1.1250	1.3562
8			
	910930	0.0000	0.0000
4			
Semicossyphus pulcher male		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Semicossyphus pulcher female		1.5833	1.5050
12			
	910809	1.3750	1.5059
8			
	910930	2.0000	1.6330
4			
Embiotoca jacksoni adult		1.4167	1.0836
12			
	910809	1.5000	1.1952
8			

	910930	1.2500	0.9574
4			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Damalichthys vacca adult		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Hypsypops rubicundus adult		4.9167	1.6765
12			
	910809	5.2500	1.4880
8			
	910930	4.2500	2.0616
4			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			
Girella nigricans adult		6.3333	4.6580

LOCATION 13 ANACAPA ISLAND - LANDING COVE

12			
	910809	8.1250	4.1897
8			
	910930	2.7500	3.5940
4			
Girella nigricans juvenile		0.0000	0.0000
12			
	910809	0.0000	0.0000
8			
	910930	0.0000	0.0000
4			

LOCATION 13 ANACAPA ISLAND - LANDING COVE

1991 SIZE FREQUENCY DISTRIBUTIONS

Haliotis corrugata

(cases) N=	49
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	2.0%
105 - 109	0.0
110 - 114	0.0
115 - 119	2.0%
120 - 124	4.1%
125 - 129	4.1%
130 - 134	10.2%
135 - 139	12.2%
140 - 144	12.2%
145 - 149	10.2%
150 - 154	10.2%
155 - 159	6.1%
160 - 164	2.0%
165 - 169	12.2%
170 - 174	2.0%
175 - 179	4.1%
180 - 184	2.0%
185 - 189	2.0%
190 - 194	2.0%
195 - 199	0.0
> 199	0.0
min size (mm)	104
max size (mm)	192
mean	148
mode	138

Astraea undosa

(cases) N=	69
< 10	0.0
10 - 19	0.0
20 - 29	2.9%
30 - 39	5.8%
40 - 49	15.9%
50 - 59	24.6%
60 - 69	17.4%
70 - 79	10.1%
80 - 89	10.1%
90 - 99	10.1%
100 - 109	2.9%
110 - 119	0.0
> 119	0.0
min size (mm)	22
max size (mm)	105
mean	63
mode	58

Hinnites giganteus

(cases) N=	56
< 10	0.0
10 - 19	0.0
20 - 29	1.8%
30 - 39	3.6%
40 - 49	12.5%
50 - 59	16.1%
60 - 69	21.4%
70 - 79	17.9%
80 - 89	8.9%
90 - 99	7.1%
100 - 109	5.4%
110 - 119	3.6%
120 - 129	0.0
130 - 139	1.8%
140 - 149	0.0
> 149	0.0
min size (mm)	26
max size (mm)	137
mean	68
mode	60

LOCATION 13 ANACAPA ISLAND - LANDING COVE

Strongylocentrotus franciscanus

(cases) N=	100
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	3.0%
30 - 34	2.0%
35 - 39	1.0%
40 - 44	0.0
45 - 49	1.0%
50 - 54	2.0%
55 - 59	2.0%
60 - 64	3.0%
65 - 69	6.0%
70 - 74	5.0%
75 - 79	14.0%
80 - 84	11.0%
85 - 90	7.0%
90 - 94	9.0%
95 - 99	12.0%
100 - 104	7.0%
105 - 109	6.0%
> 109	9.0%
min size (mm)	25
max size (mm)	121
mean	84
mode	75

Strongylocentrotus purpuratus

(cases) N=	106
< 5	0.0
5 - 9	1.9%
10 - 14	.9%
15 - 19	0.0
20 - 24	9.4%
25 - 29	5.7%
30 - 34	8.5%
35 - 39	17.9%
40 - 44	26.4%
45 - 49	13.2%
50 - 54	5.7%
55 - 59	4.7%
60 - 64	2.8%
65 - 69	1.9%
70 - 74	0.0
75 - 79	0.0
80 - 84	.9%
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	8
max size (mm)	84
mean	40
mode	42

Macrocystis pyrifera numbers of stipes.

(cases) N=	101
< 3	25.7%
3 - 5	17.8%
6 -8	11.9%
9 -11	7.9%
12 - 14	6.9%
15 - 17	5.9%
18 - 20	7.9%
21 - 23	3.0%
24 - 26	1.0%
27 - 29	5.0%
30 - 32	2.0%
33 - 35	1.0%
36 - 38	1.0%
39 - 41	1.0%
42 - 44	0.0
>44	2.0%
min number	1
max number	48
mean	11
mode	1

Macrocystis pyrifera holdfast diameters.

(cases) N=	101
< 6	23.8%
6 - 11	13.9%
12 - 17	9.9%
18 - 23	12.9%
24 - 29	14.9%
30 - 35	9.9%
36 - 41	5.9%
42 - 47	2.0%
48 - 53	4.0%
54 - 59	1.0%
60 - 65	2.0%
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	1
max width (cm)	62
mean	20
mode	3

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0000	0.0000	20
Macrocystis pyrifera juvenile	0.0250	0.1118	20
Macrocystis pyrifera all	0.0250	0.1118	20
Cypraea spadicea	0.0500	0.1539	20
Astraea undosa	0.2250	0.4723	20
Patiria miniata	0.1750	0.2936	20
Pisaster giganteus	0.1500	0.2351	20
Strongylocentrotus franciscanus	1.6000	3.0975	20
Strongylocentrotus purpuratus	52.7000	32.3131	20
Parastichopus parvimensis	1.1500	0.8127	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.8250	0.7656	20
Alloclinus holderi	0.2750	0.4128	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0972	0.0724	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.2708	0.0970	12

	Muricea fruticosa	0.0083	0.0112
12			
	Muricea californica	0.0458	0.0311
12			
	Panulirus interruptus	0.0000	0.0000
12			
	Haliotis rufescens	0.0000	0.0000
12			
	Haliotis corrugata	0.0028	0.0065
12			
	Haliotis fulgens	0.0000	0.0000
12			
	Kelletia kelletii	0.0014	0.0048
12			
	Megathura crenulata	0.0014	0.0048
12			
	Hinnites giganteus	0.0014	0.0048
12			
	Aplysia californica	0.1069	0.0668
12			
	Pycnopodia helianthoides	0.0000	0.0000
12			
	Lytechinus anamesus	16.2639	5.9448
12			

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	2.7000	3.9476	25
Miscellaneous brown algae	0.0000	0.0000	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	0.1000	0.5000	25
Macrocystis, Eisenia, Pterygophora	0.4000	1.1815	25
Miscellaneous red algae	7.7000	8.1943	25
Articulated coralline algae	0.7000	1.3540	25
Crustose coralline algae	25.0000	9.4373	25
Gelidium spp.	0.0000	0.0000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	0.0000	0.0000	25
Sponges	1.0000	1.6137	25
Corynactis californica	1.3000	2.2958	25
Balanophyllia elegans	2.9000	3.6572	25
Astrangia lajollaensis	3.1000	3.0000	25
Diopatra ornata	0.0000	0.0000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.1000	0.5000	25
Bryozoans, other	3.5000	4.8412	25
Diaperoecia californica	0.0000	0.0000	25
Tunicates	6.4000	6.2115	25
Miscellaneous invertebrates	13.5000	7.6376	25
Bare substrate	36.5000	17.7218	25
Rock	76.3000	20.4394	

Cobble	3.1000	3.8379
Sand	20.6000	20.8577

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	5.9514	16.0769
Chromis punctipinnis	32.1667	20.1035
Oxyjulis californica	35.5000	30.0893
Sebastes mystinus	0.0000	0.0000
Sebastes serranoides	0.0000	0.0000
Sebastes atrovirens	0.0000	0.0000
Paralabrax clathratus	0.7500	0.6216
Semicossyphus pulcher	2.1667	1.8007
Embiotoca jacksoni	0.0000	0.0000
Embiotoca lateralis	0.0000	0.0000
Damalichthys vacca	0.0000	0.0000
Hypsypops rubicundus	0.8333	0.7177
Girella nigricans	0.0000	0.0000

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		7.6667	10.5169	12
	910618	20.0000	8.9815	4
	910828	1.5000	2.9761	8
Chromis punctipinnis juvenile		24.5000	25.1992	12
	910618	0.0000	0.0000	4
	910828	36.7500	21.9854	8
Oxyjulis californica adult		4.5833	14.3746	12
	910618	13.7500	24.2813	4
	910828	0.0000	0.0000	8
Oxyjulis californica juvenile		30.9167	31.7475	12
	910618	0.0000	0.0000	4
	910828	46.3750	27.6506	8
Sebastes mystinus adult		0.0000	0.0000	12
	910618	0.0000	0.0000	4
	910828	0.0000	0.0000	8
Sebastes mystinus juvenile		0.0000	0.0000	12
	910618	0.0000	0.0000	4
	910828	0.0000	0.0000	8
Sebastes serranoides adult		0.0000	0.0000	12
	910618	0.0000	0.0000	4
	910828	0.0000	0.0000	8

Sebastes serranoides juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Sebastes atrovirens adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Paralabrax clathratus adult		0.7500	0.6216
12			
	910618	1.2500	0.5000
4			
	910828	0.5000	0.5345
8			
Paralabrax clathratus juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Semicossyphus pulcher male		0.1667	0.3892
12			
	910618	0.0000	0.0000
4			
	910828	0.2500	0.4629
8			
Semicossyphus pulcher female		2.0000	1.8586
12			
	910618	3.7500	1.8930
4			
	910828	1.1250	1.1260
8			
Embiotoca jacksoni adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			

	910828	0.0000	0.0000
8			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Hypsypops rubicundus adult		0.8333	0.7177
12			
	910618	0.5000	0.5774
4			
	910828	1.0000	0.7559
8			
Hypsypops rubicundus juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Girella nigricans adult		0.0000	0.0000

12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Tethya aurantia

(cases) N=	32
< 10	0.0
10 - 19	3.1%
20 - 29	3.1%
30 - 39	0.0
40 - 49	3.1%
50 - 59	25.0%
60 - 69	12.5%
70 - 79	28.1%
80 - 89	21.9%
90 - 99	3.1%
> 99	0.0
min size (mm)	18
max size (mm)	90
mean	66
mode	50

Astraea undosa

(cases) N=	26
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	3.8%
40 - 49	19.2%
50 - 59	65.4%
60 - 69	7.7%
70 - 79	3.8%
80 - 89	0.0
90 - 99	0.0
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	33
max size (mm)	71
mean	53
mode	54

Lytechinus anamesus

(cases) N=	118
< 5	0.0
5 - 9	2.5%
10 - 14	42.4%
15 - 19	54.2%
20 - 24	.8%
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
> 49	0.0
min size (mm)	7
max size (mm)	20
mean	15
mode	17

Patiria miniata

(cases) N=	32
< 10	0.0
10 - 19	0.0
20 - 29	3.1%
30 - 39	3.1%
40 - 49	18.8%
50 - 59	31.3%
60 - 69	21.9%
70 - 79	12.5%
80 - 89	3.1%
90 - 99	6.3%
> 99	0.0
min size (mm)	26
max size (mm)	91
mean	59
mode	46

Pisaster giganteus

(cases) N=	24
< 20	0.0
20 - 39	0.0
40 - 59	20.8%
60 - 79	29.2%
80 - 99	37.5%
100 - 119	4.2%
120 - 139	0.0
140 - 159	0.0
160 - 179	8.3%
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	48
max size (mm)	174
mean	86
mode	54

Strongylocentrotus franciscanus

(cases) N=	105
< 5	0.0
5 - 9	3.8%
10 - 14	8.6%
15 - 19	1.9%
20 - 24	2.9%
25 - 29	8.6%
30 - 34	11.4%
35 - 39	8.6%
40 - 44	2.9%
45 - 49	6.7%
50 - 54	3.8%
55 - 59	0.0
60 - 64	0.0
65 - 69	1.0%
70 - 74	1.9%
75 - 79	4.8%
80 - 84	9.5%
85 - 90	5.7%
90 - 94	8.6%
95 - 99	3.8%
100 - 104	3.8%
105 - 109	1.9%
> 109	0.0
min size (mm)	5
max size (mm)	109
mean	53
mode	28

Strongylocentrotus purpuratus

(cases) N=	100
< 5	0.0
5 - 9	0.0
10 - 14	5.0%
15 - 19	57.0%
20 - 24	36.0%
25 - 29	2.0%
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	13
max size (mm)	25
mean	19
mode	19

Lophogorgia chilensis heights

(cases) N=	30
< 5	0.0
5 - 8	0.0
9 - 12	3.3%
13 - 16	16.7%
17 - 20	26.7%
21 - 24	13.3%
25 - 28	23.3%
29 - 32	10.0%
33 - 36	0.0
37 - 40	3.3%
41 - 44	0.0
45 - 48	0.0
49 - 52	3.3%
53 - 56	0.0
>57	0.0
min height (cm)	12
max height (cm)	52
mean	23
mode	19

Lophogorgia chilensis widths.

(cases) N=	30
< 5	0.0
5 - 8	6.7%
9 - 12	20.0%
13 - 16	23.3%
17 - 20	13.3%
21 - 24	20.0%
25 - 28	13.3%
29 - 32	0.0
33 - 36	0.0
37 - 40	0.0
41 - 44	0.0
45 - 48	0.0
49 - 52	3.3%
53 - 56	0.0
>57	0.0
min width (cm)	6
max width (cm)	51
mean	18
mode	22

Muricea californica heights

(cases) N=	24
< 5	0.0
5 - 8	4.2%
9 - 12	0.0
13 - 16	0.0
17 - 20	0.0
21 - 24	0.0
25 - 28	12.5%
29 - 32	12.5%
33 - 36	12.5%
37 - 40	0.0
41 - 44	4.2%
45 - 48	12.5%
49 - 52	16.7%
53 - 56	8.3%
57 - 60	8.3%
61 - 64	0.0
65 - 68	0.0
69 - 72	8.3%
73 - 76	0.0
77 - 80	0.0
81 - 84	0.0
85 - 88	0.0
89 - 92	0.0
93 - 96	0.0
97 - 100	0.0
>100	0.0
min height (cm)	7
max height (cm)	72
mean	43
mode	35

Muricea californica widths

(cases) N=	24
< 5	4.2%
5 - 8	0.0
9 - 12	0.0
13 - 16	0.0
17 - 20	0.0
21 - 24	0.0
25 - 28	0.0
29 - 32	0.0
33 - 36	0.0
37 - 40	0.0
41 - 44	0.0
45 - 48	25.0%
49 - 52	8.3%
53 - 56	4.2%
57 - 60	8.3%
61 - 64	0.0
65 - 68	16.7%
69 - 72	0.0
73 - 76	8.3%
77 - 80	0.0
81 - 84	4.2%
85 - 88	4.2%
89 - 92	0.0
93 - 96	4.2%
97 - 100	4.2%
>100	8.3%
min width (cm)	4
max width (cm)	111
mean	65
mode	45

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.0000	0.0000	20
Eisenia arborea	0.0500	0.1539	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0000	0.0000	20
Macrocystis pyrifera juvenile	2.0500	6.4643	20
Macrocystis pyrifera all	2.0500	6.4643	20
Cypraea spadicea	0.1500	0.4007	20
Astraea undosa	0.5000	0.5130	20
Patiria miniata	0.0000	0.0000	20
Pisaster giganteus	0.0750	0.1832	20
Strongylocentrotus franciscanus	2.3500	1.8785	20
Strongylocentrotus purpuratus	59.5000	25.0536	20
Parastichopus parvimensis	0.3250	0.4667	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.2000	0.3770	20
Alloclinus holderi	0.9250	0.5200	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0000	0.0000	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0042	0.0075	12

	Muricea fruticosa	0.0014	0.0048
12			
	Muricea californica	0.0000	0.0000
12			
	Panulirus interruptus	0.0028	0.0096
12			
	Haliotis rufescens	0.0000	0.0000
12			
	Haliotis corrugata	0.0000	0.0000
12			
	Haliotis fulgens	0.0000	0.0000
12			
	Kelletia kelletii	0.0000	0.0000
12			
	Megathura crenulata	0.0000	0.0000
12			
	Hinnites giganteus	0.0264	0.0392
12			
	Aplysia californica	0.0736	0.0463
12			
	Pycnopodia helianthoides	0.0000	0.0000
12			
	Lytechinus anamesus	0.0000	0.0000
12			

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	2.9000	3.8649	25
Miscellaneous brown algae	2.1000	4.6030	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	0.5000	2.5000	25
Macrocystis, Eisenia, Pterygophora	7.8000	16.0941	25
Miscellaneous red algae	6.9000	6.3852	25
Articulated coralline algae	16.7000	20.0743	25
Crustose coralline algae	33.0000	16.7394	25
Gelidium spp.	2.3000	4.0774	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	1.2000	1.7854	25
Sponges	0.6000	1.4930	25
Corynactis californica	2.4000	3.2660	25
Balanophyllia elegans	0.1000	0.5000	25
Astrangia lajollaensis	3.7000	6.2965	25
Diopatra ornata	0.1000	0.5000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	0.1000	0.5000	25
Bryozoans, other	2.8000	4.8584	25
Diaperoecia californica	0.1000	0.5000	25
Tunicates	1.4000	2.6101	25
Miscellaneous invertebrates	6.5000	5.1539	25
Bare substrate	26.5000	16.9097	25

LOCATION 15 SANTA BARBARA ISLAND - ARCH POINT 150

Rock	79.7000	14.6188	25
Cobble	12.4000	11.5353	25
Sand	7.9000	6.7961	25

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Total Fish Abundance	5.5972	14.9999	144
Chromis punctipinnis	38.5000	36.6618	12
Oxyjulis californica	9.4167	9.5008	12
Sebastes mystinus	1.0000	2.8604	12
Sebastes serranoides	0.0000	0.0000	12
Sebastes atrovirens	0.0000	0.0000	12
Paralabrax clathratus	1.8333	1.5859	12
Semicossyphus pulcher	0.7500	0.8660	12
Embiotoca jacksoni	0.1667	0.5774	12
Embiotoca lateralis	0.0000	0.0000	12
Damalichthys vacca	0.0000	0.0000	12
Hypsypops rubicundus	7.9167	2.0652	12
Girella nigricans	7.5833	5.8692	12

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis adult		1.8333	1.8505	12
	910618	3.0000	2.1602	4
	910828	1.2500	1.4880	8
Chromis punctipinnis juvenile		36.6667	37.3566	12
	910618	0.0000	0.0000	4
	910828	55.0000	32.2579	8
Oxyjulis californica adult		4.4167	2.2344	12
	910618	4.2500	1.8930	4
	910828	4.5000	2.5071	8
Oxyjulis californica juvenile		5.0000	8.3883	12
	910618	0.0000	0.0000	4
	910828	7.5000	9.4415	8
Sebastes mystinus adult		0.0000	0.0000	12
	910618	0.0000	0.0000	4
	910828	0.0000	0.0000	8
Sebastes mystinus juvenile		1.0000	2.8604	12
	910618	0.2500	0.5000	4
	910828	1.3750	3.5026	8
Sebastes serranoides adult		0.0000	0.0000	12
	910618	0.0000	0.0000	4
	910828	0.0000	0.0000	8

Sebastes serranoides juvenile		0.0000	0.0000
12	910618	0.0000	0.0000
4	910828	0.0000	0.0000
8			
Sebastes atrovirens adult		0.0000	0.0000
12	910618	0.0000	0.0000
4	910828	0.0000	0.0000
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12	910618	0.0000	0.0000
4	910828	0.0000	0.0000
8			
Paralabrax clathratus adult		1.6667	1.6143
12	910618	0.5000	0.5774
4	910828	2.2500	1.6690
8			
Paralabrax clathratus juvenile		0.1667	0.3892
12	910618	0.2500	0.5000
4	910828	0.1250	0.3536
8			
Semicossyphus pulcher male		0.0833	0.2887
12	910618	0.2500	0.5000
4	910828	0.0000	0.0000
8			
Semicossyphus pulcher female		0.6667	0.8876
12	910618	1.0000	1.1547
4	910828	0.5000	0.7559
8			
Embiotoca jacksoni adult		0.1667	0.5774
12	910618	0.5000	1.0000
4			

	910828	0.0000	0.0000
8			
Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca adult		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910618	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Hypsypops rubicundus adult		7.5000	2.2764
12			
	910618	8.7500	1.5000
4			
	910828	6.8750	2.4165
8			
Hypsypops rubicundus juvenile		0.4167	0.5149
12			
	910618	0.0000	0.0000
4			
	910828	0.6250	0.5175
8			
Girella nigricans adult		7.1667	6.1472

12			
	910618	0.0000	0.0000
4			
	910828	10.7500	3.9188
8			
Girella nigricans juvenile		0.4167	1.1645
12			
	910618	1.0000	2.0000
4			
	910828	0.1250	0.3536
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Astraea undosa

(cases) N=	101
< 10	0.0
10 - 19	0.0
20 - 29	5.0%
30 - 39	13.9%
40 - 49	10.9%
50 - 59	11.9%
60 - 69	12.9%
70 - 79	12.9%
80 - 89	17.8%
90 - 99	10.9%
100 - 109	2.0%
110 - 119	1.0%
> 119	1.0%
min size (mm)	22
max size (mm)	126
mean	65
mode	35

Pisaster giganteus

(cases) N=	68
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	5.9%
80 - 99	16.2%
100 - 119	25.0%
120 - 139	25.0%
140 - 159	17.6%
160 - 179	8.8%
180 - 199	1.5%
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	66
max size (mm)	183
mean	123
mode	130

Strongylocentrotus franciscanus

(cases) N=	111
< 5	1.8%
5 - 9	1.8%
10 - 14	3.6%
15 - 19	8.1%
20 - 24	6.3%
25 - 29	3.6%
30 - 34	6.3%
35 - 39	3.6%
40 - 44	1.8%
45 - 49	5.4%
50 - 54	5.4%
55 - 59	3.6%
60 - 64	9.0%
65 - 69	9.0%
70 - 74	14.4%
75 - 79	7.2%
80 - 84	6.3%
85 - 90	0.0
90 - 94	2.7%
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	3
max size (mm)	92
mean	51
mode	73

Strongylocentrotus purpuratus

(cases) N=	103
< 5	0.0
5 - 9	6.8%
10 - 14	6.8%
15 - 19	8.7%
20 - 24	20.4%
25 - 29	17.5%
30 - 34	22.3%
35 - 39	8.7%
40 - 44	5.8%
45 - 49	2.9%
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	5
max size (mm)	48
mean	26
mode	30

Macrocystis pyrifera numbers of stipes

(cases) N=	64
< 3	34.4%
3 - 5	31.3%
6 -8	14.1%
9 -11	3.1%
12 - 14	7.8%
15 - 17	1.6%
18 - 20	1.6%
21 - 23	3.1%
24 - 26	1.6%
27 - 29	1.6%
>29	0.0
min number	1
max number	28
mean	6
mode	2

Macrocystis pyrifera holdfast diameters

(cases) N=	64
< 6	35.9%
6 - 11	31.3%
12 - 17	14.1%
18 - 23	4.7%
24 - 29	9.4%
30 - 35	1.6%
36 - 41	3.1%
42 - 47	0.0
48 - 53	0.0
54 - 59	0.0
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	1
max width (cm)	39
mean	11
mode	4

1991 QUADRAT DATA: MEAN NUMBER PER M^2

Species	Mean	Std Dev	Cases
Macrocystis pyrifera adult	0.1500	0.4617	20
Eisenia arborea	0.0000	0.0000	20
Pterygophora californica	0.0000	0.0000	20
Laminaria farlowii	0.0000	0.0000	20
Macrocystis pyrifera juvenile	4.2250	10.6208	20
Macrocystis pyrifera all	4.3750	11.0369	20
Cypraea spadicea	0.1250	0.3193	20
Astraea undosa	0.2750	0.4435	20
Patiria miniata	0.0000	0.0000	20
Pisaster giganteus	0.1750	0.3726	20
Strongylocentrotus franciscanus	1.7000	2.0673	20
Strongylocentrotus purpuratus	37.2500	20.1713	20
Parastichopus parvimensis	0.4000	0.5026	20
Styela monteryensis	0.0000	0.0000	20
Lythrypnus dalli	0.0000	0.0000	20
Coryphopterus nicholsii	0.1000	0.2616	20
Alloclinus holderi	0.3750	0.3932	20

1991 BAND TRANSECT DATA: MEAN NUMBER PER M^2

Tethya aurantia	0.0014	0.0048	12
Allopora californica	0.0000	0.0000	12
Tealia lofotensis	0.0000	0.0000	12
Lophogorgia chilensis	0.0014	0.0048	12

	Muricea fruticosa	0.0000	0.0000
12			
	Muricea californica	0.0014	0.0048
12			
	Panulirus interruptus	0.0264	0.0417
12			
	Haliotis rufescens	0.0000	0.0000
12			
	Haliotis corrugata	0.0014	0.0048
12			
	Haliotis fulgens	0.0028	0.0065
12			
	Kelletia kelletii	0.0000	0.0000
12			
	Megathura crenulata	0.0000	0.0000
12			
	Hinnites giganteus	0.0014	0.0048
12			
	Aplysia californica	0.0583	0.0411
12			
	Pycnopodia helianthoides	0.0000	0.0000
12			
	Lytechinus anamesus	0.0000	0.0000
12			

1991 RANDOM POINT CONTACT DATA: MEAN PERCENT COVER

Species	Mean	Std Dev	Cases
Green Algae	1.2000	2.6141	25
Miscellaneous brown algae	2.9000	6.1101	25
Desmarestia spp.	0.0000	0.0000	25
Laminaria farlowii	0.0000	0.0000	25
Cystoseira spp.	3.8000	9.2455	25
Macrocystis, Eisenia, Pterygophora	10.8000	24.9658	25
Miscellaneous red algae	7.0000	6.2082	25
Articulated coralline algae	13.1000	18.1613	25
Crustose coralline algae	31.9000	16.0773	25
Gelidium spp.	0.1000	0.5000	25
Gigartina spp.	0.0000	0.0000	25
Miscellaneous plants	4.4000	5.5095	25
Sponges	1.3000	2.5125	25
Corynactis californica	0.2000	0.6922	25
Balanophyllia elegans	0.7000	1.6956	25
Astrangia lajollaensis	1.6000	2.6887	25
Diopatra ornata	0.0000	0.0000	25
Phragmatopoma californica	0.0000	0.0000	25
Serpulorbis squamigerus	1.0000	2.3936	25
Bryozoans, other	2.9000	6.4015	25
Diaperoecia californica	0.8000	2.4707	25
Tunicates	1.9000	3.4065	25
Miscellaneous invertebrates	14.9000	10.3953	25
Bare substrate	27.6000	17.5071	25

LOCATION 16 SANTA BARBARA ISLAND - CAT CANYON 160

	Rock	79.5000	21.6627
25			
	Cobble	3.0000	7.0341
25			
	Sand	17.4000	19.2365
25			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

	Total Fish Abundance	7.0139	21.7979
144			
	Chromis punctipinnis	21.7500	13.8965
12			
	Oxyjulis californica	56.0000	51.7230
12			
	Sebastes mystinus	0.0833	0.2887
12			
	Sebastes serranoides	0.0833	0.2887
12			
	Sebastes atrovirens	0.1667	0.3892
12			
	Paralabrax clathratus	1.0000	0.6030
12			
	Semicossyphus pulcher	0.9167	0.9003
12			
	Embiotoca jacksoni	0.1667	0.3892
12			
	Embiotoca lateralis	0.2500	0.6216
12			
	Damalichthys vacca	0.0000	0.0000
12			
	Hypsypops rubicundus	2.1667	1.1146
12			
	Girella nigricans	1.5833	1.4434
12			

1991 FISH TRANSECT DATA: MEAN NUMBER PER TRANSECT

Species	Date (year/month/day)	Mean	Std Dev	Cases
Chromis punctipinnis	adult	21.7500	13.8965	12
	910620	15.5000	10.6615	4
	910828	24.8750	14.8751	8
Chromis punctipinnis	juvenile	0.0000	0.0000	12
	910620	0.0000	0.0000	4
	910828	0.0000	0.0000	8
Oxyjulis californica	adult	8.5000	6.6946	12
	910620	3.0000	1.1547	4
	910828	11.2500	6.6279	8
Oxyjulis californica	juvenile	47.5000	50.2946	12
	910620	0.0000	0.0000	4
	910828	71.2500	45.1782	8
Sebastes mystinus	adult	0.0000	0.0000	12
	910620	0.0000	0.0000	4
	910828	0.0000	0.0000	8
Sebastes mystinus	juvenile	0.0833	0.2887	12
	910620	0.2500	0.5000	4
	910828	0.0000	0.0000	8
Sebastes serranoides	adult	0.0833	0.2887	12
	910620	0.0000	0.0000	4
	910828	0.1250	0.3536	8

Sebastes serranoides juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Sebastes atrovirens adult		0.1667	0.3892
12			
	910620	0.5000	0.5774
4			
	910828	0.0000	0.0000
8			
Sebastes atrovirens juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Paralabrax clathratus adult		0.9167	0.6686
12			
	910620	0.7500	0.5000
4			
	910828	1.0000	0.7559
8			
Paralabrax clathratus juvenile		0.0833	0.2887
12			
	910620	0.0000	0.0000
4			
	910828	0.1250	0.3536
8			
Semicossyphus pulcher male		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Semicossyphus pulcher female		0.9167	0.9003
12			
	910620	0.5000	1.0000
4			
	910828	1.1250	0.8345
8			
Embiotoca jacksoni adult		0.1667	0.3892
12			
	910620	0.0000	0.0000
4			
	910828	0.2500	0.4629

Embiotoca jacksoni juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis adult		0.2500	0.6216
12			
	910620	0.7500	0.9574
4			
	910828	0.0000	0.0000
8			
Embiotoca lateralis juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca adult		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Damalichthys vacca juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			
Hypsypops rubicundus adult		2.0000	1.0445
12			
	910620	2.0000	0.8165
4			
	910828	2.0000	1.1952
8			
Hypsypops rubicundus juvenile		0.1667	0.3892
12			
	910620	0.0000	0.0000
4			
	910828	0.2500	0.4629
8			
Girella nigricans adult		1.5833	1.4434
12			

LOCATION 16 SANTA BARBARA ISLAND - CAT CANYON 164

	910620	0.0000	0.0000
4			
	910828	2.3750	1.0607
8			
Girella nigricans juvenile		0.0000	0.0000
12			
	910620	0.0000	0.0000
4			
	910828	0.0000	0.0000
8			

1991 SIZE FREQUENCY DISTRIBUTIONS

Haliotis corrugata

(cases) N=	12
< 25	0.0
25 - 29	0.0
30 - 34	0.0
35 - 39	0.0
40 - 44	0.0
45 - 49	0.0
50 - 54	0.0
55 - 59	0.0
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	8.3%
110 - 114	0.0
115 - 119	8.3%
120 - 124	16.7%
125 - 129	0.0
130 - 134	8.3%
135 - 139	8.3%
140 - 144	0.0
145 - 149	25.0%
150 - 154	16.7%
155 - 159	0.0
160 - 164	8.3%
165 - 169	0.0
170 - 174	0.0
175 - 179	0.0
180 - 184	0.0
185 - 189	0.0
190 - 194	0.0
195 - 199	0.0
> 199	0.0
min size (mm)	108
max size (mm)	162
mean	137
mode	148

Astraea undosa

(cases) N=	32
< 10	0.0
10 - 19	0.0
20 - 29	0.0
30 - 39	0.0
40 - 49	0.0
50 - 59	9.4%
60 - 69	15.6%
70 - 79	53.1%
80 - 89	18.8%
90 - 99	3.1%
100 - 109	0.0
110 - 119	0.0
> 119	0.0
min size (mm)	51
max size (mm)	95
mean	73
mode	71

Pisaster giganteus

(cases) N=	32
< 20	0.0
20 - 39	0.0
40 - 59	0.0
60 - 79	0.0
80 - 99	3.1%
100 - 119	56.3%
120 - 139	21.9%
140 - 159	15.6%
160 - 179	3.1%
180 - 199	0.0
200 - 219	0.0
220 - 239	0.0
240 - 259	0.0
260 - 279	0.0
280 - 299	0.0
> 299	0.0
min size (mm)	98
max size (mm)	163
mean	119
mode	101

Strongylocentrotus franciscanus

(cases) N=	114
< 5	1.8%
5 - 9	1.8%
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	0.0
30 - 34	.9%
35 - 39	5.3%
40 - 44	8.8%
45 - 49	9.6%
50 - 54	8.8%
55 - 59	14.9%
60 - 64	14.0%
65 - 69	7.9%
70 - 74	12.3%
75 - 79	8.8%
80 - 84	4.4%
85 - 90	0.0
90 - 94	0.0
95 - 99	.9%
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	3
max size (mm)	99
mean	58
mode	64

Strongylocentrotus purpuratus

(cases) N=	107
< 5	0.0
5 - 9	0.0
10 - 14	0.0
15 - 19	0.0
20 - 24	0.0
25 - 29	9.3%
30 - 34	33.6%
35 - 39	25.2%
40 - 44	22.4%
45 - 49	6.5%
50 - 54	1.9%
55 - 59	.9%
60 - 64	0.0
65 - 69	0.0
70 - 74	0.0
75 - 79	0.0
80 - 84	0.0
85 - 90	0.0
90 - 94	0.0
95 - 99	0.0
100 - 104	0.0
105 - 109	0.0
> 109	0.0
min size (mm)	27
max size (mm)	57
mean	37
mode	36

Macrocystis pyrifera numbers of stipes.

(cases) N=	110
< 3	20.9%
3 - 5	19.1%
6 -8	10.9%
9 -11	12.7%
12 - 14	11.8%
15 - 17	10.9%
18 - 20	4.5%
21 - 23	4.5%
24 - 26	1.8%
27 - 29	0.0
30 - 32	.9%
33 - 35	.9%
36 - 38	0.0
39 - 41	0.0
42 - 44	0.0
>44	.9%
min number	1
max number	53
mean	10
mode	2

Macrocystis pyrifera holdfast diameters.

(cases) N=	110
< 6	15.5%
6 - 11	20.0%
12 - 17	0.0
18 - 23	5.5%
24 - 29	9.1%
30 - 35	5.5%
36 - 41	2.7%
42 - 47	1.8%
48 - 53	0.0
54 - 59	0.0
60 - 65	0.0
66 - 71	0.0
72 - 77	0.0
78 - 83	0.0
84 - 89	0.0
>89	0.0
min width (cm)	2
max width (cm)	44
mean	16
mode	17

Appendix B. 1991 Species List for all Channel Islands National Park Kelp Forest Monitoring Stations.

Introduction

The species list contains presence/absence and relative abundance data for all species that could be found during the site visits between June and October. Generally at least one dive is made by an experienced biologist strictly for species list observations. The overall effort varies from station to station with the water conditions and available time. Relative abundance values are subjective, and generally based on opinions of several divers viewing the overall site. Some species assemblages are more difficult to identify than others and may be lumped into general categories. Organism were generally not collected for additional taxonomic work. When identification is tentative we either do not mark it or place a question mark on the list. Some categories, (eg. sponges or tunicates) may be much more diverse than it would appear from the list.

Abundance Ratings

- X - present, no relative abundance rating given
- 4 - abundant, organism present in higher than normal densities
- 3 - common, organism found over most of site or in high density patches
- 2 - present, organism found in moderate numbers
- 1 - rare, few organisms found
- 0 - noticeably absent, an effort was made to look for an organism that was not found.

Notes

- e - eggs
- j or jvs - juvenile
- s - shell only
- int - intertidal
- d - drift
- PM or night - seen only on night dive
- JX - juveniles present and adults present
- J#/# - (e.g. J3/2 - juvenile abundance 3, adult abundance 2)
- nests - hypsypop nest turf
- dis - diseased

Station names are listed in Table 3 of the text.