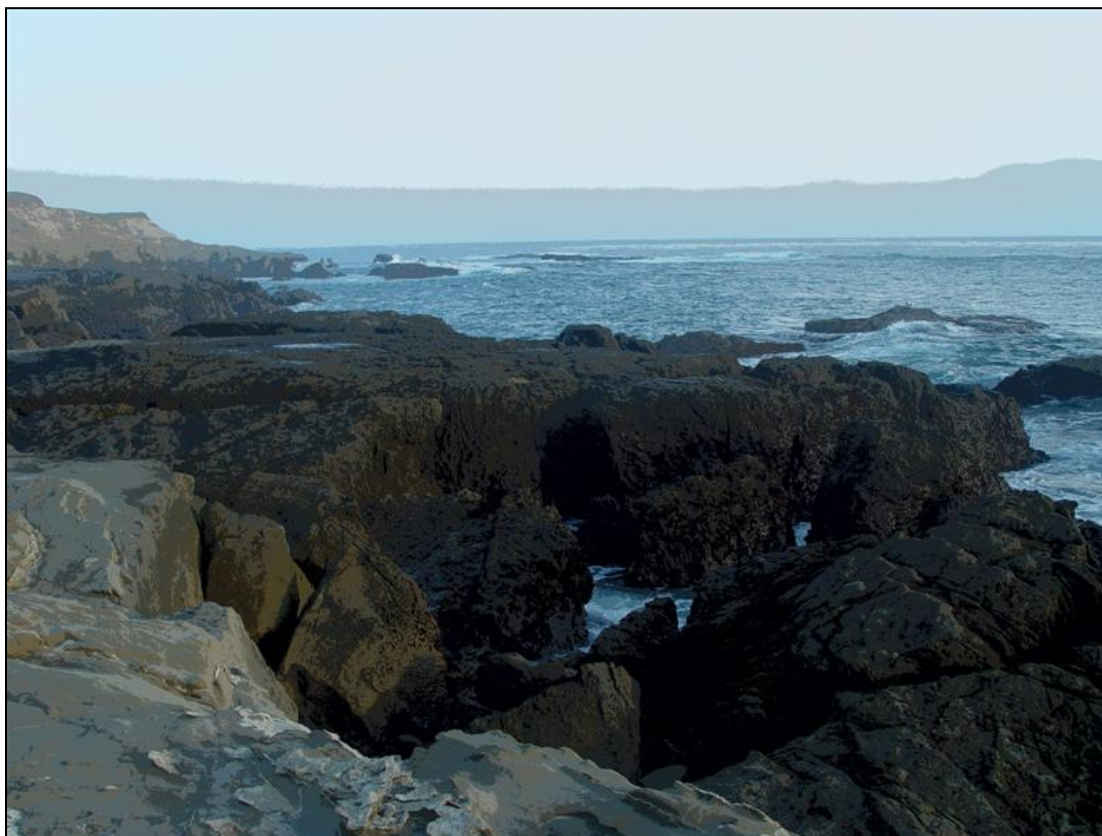




Rocky Intertidal Community Monitoring at Channel Islands National Park

2006 Annual Report

Natural Resource Data Series NPS/CHIS/NRDS—2011/582



ON THE COVER

Rocky intertidal near Fossil Reef, Santa Rosa Island

Photograph by: Dan Richards

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Channel Islands National Park
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This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Executive Summary

Channel Islands National Park includes the five northern islands off the coast of southern California and the surrounding waters out one nautical mile. Approximately 80% of the 176 miles of coastline around the islands is rocky. The diversity and undisturbed nature of the tidepools of this rocky coastline was recognized as a special feature of the islands in the enabling legislation. To gain information to conserve these communities unimpaired for future generations, the NPS has been monitoring the rocky intertidal at the islands since 1982. This report summarizes the 2006 sampling year efforts (from March 2006 to January 2007) and findings of the Channel Islands National Park (CINP) Rocky Intertidal Monitoring Program.

Specific monitoring objectives are: 1) to determine the long-term trends in percent cover of key sessile organisms in the rocky intertidal ecosystem (Table 1), and 2) to determine population dynamics of *Haliotis cracherodii*, *Lottia gigantea*, and *Pisaster ochraceus*. Objectives are met by monitoring percent cover of core species in target intertidal zones using photoplots and transects, monitoring species composition and abundance of motile invertebrates using photoplots, measuring size frequency and abundance of black abalone, owl limpets, and seastars using fixed plots or timed searches.

Thirteen key species or species groups are monitored at 21 sites on the five park islands (Figure 1) as part of the Rocky Intertidal Monitoring Program. Fixed photoplots are used to monitor the percent cover of thatched and acorn barnacles (*Tetraclita rubescens*, *Balanus glandula*/*Chthamalus* spp.), mussels (*Mytilus californianus*), rockweeds (*Silvetia compressa* and *Hesperophycus californicus*), turfweed (*Endocladia muricata*), red algal turf (*Pterocladia* spp. and *Gelidium* spp.), goose barnacles (*Pollicipes polymerus*), and tar. Point-intercept transects are used to determine the percent cover of surfgrass (*Phyllospadix* spp.). Information about size distribution (i.e. “size-frequency” data) is collected for owl limpets (*Lottia gigantea*) in circular plots. Size distribution and relative abundance of black abalone (*Haliotis cracherodii*) and ochre sea stars (*Pisaster ochraceus*) is determined using timed searches. Shorebirds and pinnipeds are counted at each site. Visitor numbers for the Anacapa tidepools were reported by the concession boats and are presented here.

Sites were established between 1982 and 1994. Site selection considered visitation, accessibility, presence of representative organisms, wildlife disturbance, and safety. The monitoring protocol is detailed in Richards and Davis (1988). Additional protocol for Santa Cruz Island is detailed in Engle *et al.* (1998). Updated protocol summaries can be found in Richards and Lerma (2000), and Richards *et al.* (2010).

During the 2006 sampling season, we monitored all 21 sites at least once (Table 2). Most sites were not sampled in spring because of weather, logistics, or conflicts with breeding animals. We used digital cameras for all photos taken in 2006. Photoplots were either scored in the field or from digital images on the computer with grids digitally over-laid.

Mytilus californianus cover was above the long-term mean at ten sites, continuing the trend seen during the last two years (Figure 5). Cover of *M. californianus* reached record levels this year at Landing Cove, Sea Lion Rookery, Prisoner’s Harbor and Fraser Cove. Mussel cover at Trailer was still below average but had improved greatly from the all-time low reached last year.

Acorn barnacle, *Balanus/Chthamalus*, recruitment was high at Santa Rosa, Anacapa, and Santa Barbara Islands (Figure 5). Cat Rock reached the highest acorn barnacle cover recorded at the site since monitoring began in 1982. Variation was high though at Middle Anacapa East, Prisoner's Harbor. Barnacle cover in plots at Santa Barbara was low, despite high recruitment, due to the sea lion trampling there.

Turfweed, *Endocladia muricata*, cover was variable with several sites having much higher than average cover and most others near or below average (Figures 4&5). In spring 2006, *E. muricata* cover at Scorpion Rock reached record-high percentages (Figure 4). *Endocladia* at Sea Lion Rookery was scarcely present at 3-5 % cover and thalli were small. *Ulva* sp. dominated the plots there perhaps due to the constant presence of sealions trampling the reef. At Prisoner's Harbor, extremely dense patches of *Scytosiphon dotyii* partially obscured some of the *E. muricata* on the western end of the Prisoner's reef.

Rockweed, *Silvetia compressa*, cover was well below the long-term mean at most sites and was nearly missing in plots at Landing Cove and Crook Point. Rockweeds in general have been on a multi-year decline at most sites, though *Hesperophycus californicus* tends to be a little more variable. Harris Point, which has a different (short) form of *Hesperophycus*, was the only site to show an increase in cover of rockweed.

High sand levels were seen at South Frenchy's Cove and Johnson's Lee. The highest sand levels we have ever observed at Johnson's Lee were seen in December. This was the second year in a row for high sand in December and January. Several of the photoplots were completely buried by thick sand estimated to be at least 10 to 30 cm deep (Figure 3).

The invasive red alga, *Caulacanthus ustulatus*, first discovered in 2005 at Middle-East Anacapa Island, was still present and new colonies of it were found on adjacent reefs at Middle West and Harbor Seal Arch.

Thirty-minute timed counts for abalone were conducted at all sites except Scorpion Rock. A total of 175 *Haliotis cracherodii* were counted in fall 2006 at all the sites. Otter Harbor once again had the largest population of *H. cracherodii*, with 63 measured in a 30 minute search. Willows Anchorage had the most we have ever counted there with 26, up from 9 in 2005. A dead and withered *H. cracherodii* was found at Trailer in 2006, the only apparent disease victim found.

Ochre seastars, *Pisaster ochraceus*, were counted during 30-minute searches at nearly every site; over 100 seastars were found at Ford Point, Orizaba Cove, Johnson's Lee, Willows Anchorage, Trailer, Fossil Reef, Cuyler Harbor, and Crook Point. Middle Anacapa West and Scorpion Rock also had relatively high numbers. *P. ochraceus* were not very numerous at either Santa Barbara Island site and were rare to uncommon at Northwest-Talcott, South Frenchy's Cove, Prisoner's Harbor, and Harris Point. Small juveniles were found at all sites except Fossil Reef. We observed increased incidences of seastar wasting disease during the summer but no disease was reported during the fall monitoring.

Little change was seen in owl limpets, *Lottia gigantea*, in 2006. Trailer was the only site where we saw a slight upturn in density following a two year decline. Yet, few small limpets were present in plots at the site. South Frenchy's Cove and all the Santa Rosa Island sites had small declines in density in 2006. The largest *L. gigantea* were measured at Northwest-Talcott where several individuals were greater than 100 mm and the largest was 112 mm. Sand inundated the *Lottia* plots at Johnson's Lee.

Surfgrass, *Phyllospadix* spp., overstory cover remained relatively high in all transects with little change over the years. The Santa Cruz Island sites saw slightly increased surfgrass cover over the years of monitoring. Very little bleaching was noted which was surprising because of the low tides and warm weather in preceding days.

Black oystercatchers, *Haematopus bachmani*, were again the most ubiquitous shorebird; they were seen at least once at all sites except Ford Point and Johnson's Lee. There was a total of six sightings of American oystercatchers, *H. palliates*, from five different sites on the four northern islands. Black turnstones, wandering tattler and western sandpiper were the only other shorebirds seen. Only small groups of black turnstones were seen and these were observed at only five sites.

Harbor seals, *Phoca vitulina*, were observed at or near seven sites. They were most numerous in the spring sample at Cat Rock whereby 43 seals were seen hauled out on the gravel beaches flanking the monitoring site, which in turn, prevented landing and monitoring at the site.

Total visitation from concession boats in 2006 was only 1326 passengers (Table 10) which was the lowest since 1992 (Figure 17). In 2006, 89 percent of visitation occurred in the spring (February-April) with March being the busiest month. We suspect that inopportune timing of low tides during the latter part of the year to be one reason visitation was low most months.

Acknowledgments

The National Park Service, Channel Islands National Park (CINP) funded this program. California Department of Fish and Game and Channel Islands National Marine Sanctuary (CINMS) provided staff time and general assistance on several events. Boat time (five days in spring and four in fall) was provided by CINMS. Temperature loggers and temperature data management were provided by the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) Marine Science Institute, University of California, Santa Barbara (UCSB).

As with any large project there are many people “behind the scenes” that make it possible to actually conduct the work. We are indebted to the administrative clerks, dispatchers, boat operators, maintenance workers, and rangers of Channel Islands National Park that help with the day-to-day operations.

Special thanks to the Channel Islands National Marine Sanctuary (CINMS) for providing boat time and staff assistance with the monitoring. This work was performed in part at the University of California Natural Reserve System, Santa Cruz Island Reserve on property owned and managed by The Nature Conservancy. Thanks to Dr. Lyndal Laughrin and staff at the UC reserve field station for their assistance. Thanks also to Carol Blanchette, Haven Livingston, Kyle Walters, Rani Gaddam and others from the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) Marine Science Institute, University of California, Santa Barbara (UCSB), and UC Santa Cruz (UCSC) for their collaboration. Bonnie Becker came up from Cabrillo National Monument to assist us with the database, fixing the macros necessary to convert the Access data between the CINP and MARINE databases.

We are grateful to the many people that assisted with the monitoring during the 2006 sampling, including: Matt Churape VIP, Rani Gaddam UCSC PISCO, Ali Griffiths SCA Intern CINP, Connie Jenkins VIP, Danielle Lipski CINMS, Haven Livingston UCSC PISCO, Mike Moss NPS, Kenneth Niessen Biologist/ Consultant CINP, Kyle Walters UCSC PISCO, and Ian Williams NPS.

List of Acronyms

Acronym	Description
ANI	Anacapa Island
ANCR	Anacapa, Cat Rock
ANSFC	Anacapa, South Frenchy's Cove
ANMW	Anacapa, Middle West
ANME	Anacapa, Middle East
CDFG	California Department of Fish and Game
CINP	Channel Islands National Park
CINMS	Channel Islands National Marine Sanctuary
ENSO	El Niño Southern Oscillation
GIS	Geographic Information System
MARINe	Multi-Agency Rocky Intertidal Network
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPS	National Park Service
PISCO	Partnership for Interdisciplinary Studies of Coastal Oceans
PIT	Passive Integrated Transponder
SCA	Student Conservation Association
SBI	Santa Barbara Island
SBLC	Santa Barbara, Landing Cove
SBSLR	Santa Barbara, Sea Lion Rookery
SCI	Santa Cruz Island
SCFC	Santa Cruz, Fraser Cove
SCTR	Santa Cruz, Trailer
SCWA	Santa Cruz, Willows Anchorage
SCSR	Santa Cruz, Scorpion Rock
SCPH	Santa Cruz, Prisoner's Harbor
SCOC	Santa Cruz Orizaba Cove
SMCA	State Marine Conservation Area
SMI	San Miguel Island
SMCH	San Miguel, Cuyler Harbor
SMCP	San Miguel, Crook Point
SMOH	San Miguel, Otter Harbor
SMHP	San Miguel, Harris Point
SMR	State Marine Reserve
SRI	Santa Rosa Island
SRFR	Santa Rosa, Fossil Reef
SRJL	Santa Rosa, Johnson's Lee
SRFP	Santa Rosa, Ford Point
SRNWT	Santa Rosa, Northwest-Talcott

Acronym	Description
SREP	Santa Rosa, East Point
TNC	The Nature Conservancy
UCLA	University of California Los Angeles
UCSB	University of California Santa Barbara
UCSC	University of California Santa Cruz
WS	Withering Syndrome

Introduction

The rocky intertidal zone is a compact and biologically-diverse area between marine and terrestrial habitats. Marine organisms living within this zone are highly adapted to physical disturbance and severe-temperature fluctuations and are subject to both marine and terrestrial predators. The intense pressure from both physical and biological entities has promoted highly-diverse invertebrate and algal assemblages within the rocky intertidal zone as indicated by the vast number of organisms that cannot live without the alternating exposure to both air and sea.

CINP and CINMS encompass the four northern Channel Islands and Santa Barbara Island off the coast of southern California. The park islands and surrounding waters bear the designation of an International Biosphere Reserve and State of California Areas of Special Biological Significance. The State of California maintains jurisdiction over the marine resources and manages them through the California Department of Fish and Game (CDFG). In 2003, a network of marine reserves was established around the Channel Islands. Four of the rocky intertidal monitoring sites fall inside State Marine Reserves and two more are immediately adjacent to reserve boundaries (Figure 1).

The “undisturbed tide pools” are unique features specifically mentioned in the enabling legislation for CINP. The law establishing the park (16-USC-410) also mandated the development of inventories and monitoring of natural resources in the park. Rocky intertidal monitoring began in 1982 with the following goals: 1) to monitor trends in population dynamics of selected indicator organisms, 2) to determine normal limits of variation, 3) to discover abnormal conditions, 4) to provide remedies for management problems, and 5) to measure the success of management actions.

Specific monitoring objectives are: 1) to determine the long-term trends in percent cover of key sessile organisms in the rocky intertidal ecosystem (Table 1), and 2) to determine population dynamics of *Haliotis cracherodii*, *Lottia gigantea*, and *Pisaster ochraceus*. Objectives are met by monitoring percent cover of core species in target intertidal zones using fixed photoplots and fixed transects, monitoring species composition and abundance of motile invertebrates using photoplots, measuring size frequency and abundance of black abalone, owl limpets, and seastars using fixed plots or timed searches. Monitoring is done twice each year during spring and fall to monitor the effects of winter storms and summer warm water.

Rocky intertidal monitoring began at Anacapa Island (VTN Oregon 1984) initially with an emphasis on monitoring trampling effects, based on concerns for visitor impacts (Littler 1978). The program was expanded in 1985 to include the other park islands and to look more broadly at the ecology and possible impacts in other areas. Impacts from harvest, oil spills, and climate change may be of particular interest as future management concerns.

CINP Rocky Intertidal Monitoring is part of a government and non-government consortium called the Multi-Agency Rocky Intertidal Network (MARINe) (Dunaway et al. 1998). Within MARINe, we are working to standardize collection of data and make it available to member groups in a centralized database (Engle 2005). Within the MARINe network, there are sites from Baja California to Alaska, including the Channel Islands. By working with MARINe we have

access to consistent data collected using a standardized protocol that can be used for a much broader regional analysis of changes to the intertidal communities.

This report summarizes the 2006 sampling year efforts (from March 2006 to January 2007) and documents activities and observations of the CINP Rocky Intertidal Monitoring Program. Monitoring results were previously reported in Richards 1986, 1988, 1998, Richards and Lerma 2000, 2002 2005a, 2005b, Richards et al. 2010, and Richards and Rich 2009, 2010. Additional black abalone monitoring results have been presented in Haaker et al. 1992, Davis et al. 1992, and Richards and Davis 1993.

Methods

Study Area

The California Channel Islands are comprised of eight islands in the Southern California Bight, five of which are within the Channel Islands National Park. The five park islands have about 323 kilometers (176 miles) of coastline, the majority of which is rocky shore (approximately 80%). Rock types vary from hard weathered volcanic basalt or breccias to easily eroded Monterey shale and sandstone. Sites were originally established to include the various exposures and rock types of each of the islands, though broad rocky benches were targeted.

The park islands span the transition zone between cooler waters of the Oregonian biogeographic province and the warmer Californian waters from the south. Mean annual air temperature along the mainland in this area is 15°C. Mean rainfall is about 38 cm per year (Daily et al. 1993). There is a climatic gradient across the island chain with San Miguel Island having the most precipitation, cloud cover, and wind. Santa Barbara Island to the southeast is the warmest and driest. The mean monthly sea temperatures range from 13°C in April at San Miguel Island to nearly 20°C at Santa Barbara Island in August and September (Engle and Richards 2001). Swell varies through the year with winter storms bringing high northwest wind and waves during winter and spring, and distant southern hemisphere storms sending large swells to the south-facing shores in summer.

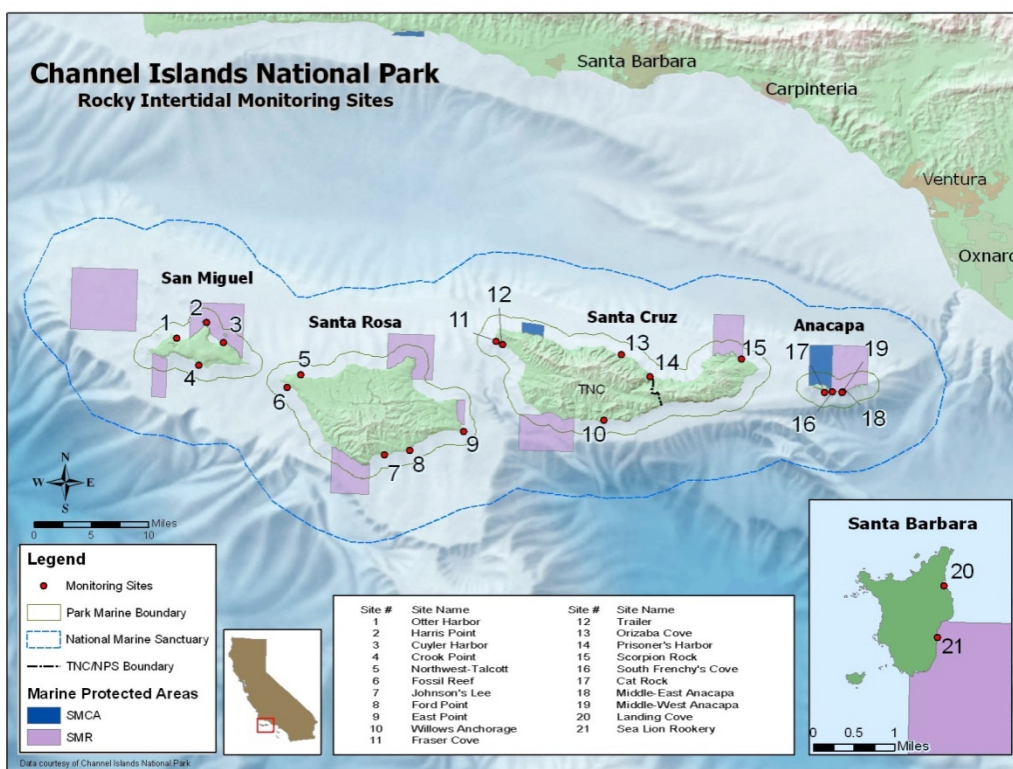


Figure 1. Rocky Intertidal Community Monitoring Site Locations in Channel Islands National Park.

Monitoring

The Channel Islands National Park Rocky Intertidal Monitoring Program has 21 sites on the five park islands (Figure 1). Sites were established between 1982 and 1994. Site selection considered visitation, accessibility, presence of representative organisms, wildlife disturbance, and safety. Sampling is usually conducted twice each year, in spring and fall. In 2006, sites were monitored in spring (March) and fall (October- January 2007). The monitoring protocol is detailed in Richards and Davis (1988). Additional protocol information for Santa Cruz Island is detailed in Engle *et al.* (1998). Updated protocol summaries can be found in Richards and Lerma (2000), and Richards *et al.* (2010). Also see Engle (2008) for updated MARINE protocols. See Appendix A for administrative notes about the program in 2006.

Data are maintained in Microsoft Access databases and Excel files in the Channel Islands National Park network and MARINE. Past annual reports are available on the internet at <http://science.nature.nps.gov/im/units/medn/>.

Thirteen core species or assemblages are targeted for monitoring in fixed photo-plots to determine percent cover (Table 1). These target species and assemblages are often common and generally used to define a band or zone within the intertidal zone. Target species and assemblages include thatched and acorn barnacles (*Tetraclita rubescens*, *Balanus glandula*/*Chthamalus* spp.), mussels (*Mytilus californianus*), rockweeds (*Silvetia compressa* and *Hesperophycus californicus*), turfweed (*Endocladia muricata*), red algal turf (*Pterocladia* spp. and *Gelidium* spp.), goose (or leaf) barnacles (*Pollicipes polymerus*), and tar which occurs naturally from oil seeps in the channel and can form a thick persistent cover over the substratum. An additional 32 taxa or substrata are also monitored when present (see Table 1 for list of taxa¹). The fixed plots (50 x 75 cm) are photographed on each visit. In most cases, there are five replicate plots in each zone initially established over high densities of the target species. Not all core species (zones) are represented at each site.

In 2006, all photo-plots were photographed with a digital camera, Olympus Camedia Z-5050, in a waterproof housing. The percent cover of core organisms was determined either in the field by laying a grid (50 x 75 cm) of one-hundred evenly-spaced points (10 x 10) over the plot (Figure 2), or when conditions were unfavorable or insufficient time was available, in the office from the digital images. In the office, a digitized grid of one-hundred evenly-spaced points (10 x 10) was created in Adobe Photoshop and overlaid on the image to provide complete coverage of the plot. Under both scoring protocols, layered organisms were not counted separately. Therefore the total cover of the top-most layer (with few exceptions – see Engle 2008) summed 100%. Data were recorded onto pre-printed data sheets then entered into the database and reviewed for errors.

¹ Taxa are defined as species or groups of similar species that may not be easily separated in the field. Core taxa are those identified by MARINE as species to be searched for and counted by all groups.

Relative abundance and size structure were collected for three species. *Haliotis cracherodii*, black abalone, were counted and measured in fixed irregular plots (5 plots per site) at eleven sites where plots have been established. At each site, a search of a defined area of the reef (or for a period of 30-minutes) was made to obtain a relative abundance of abalone. *Lottia gigantea*, giant owl limpets, were measured within fixed-circular plots of one-meter radius (3 to 5 plots per site) (Figure 3). *Pisaster ochraceus*, ochre sea stars, were counted along with other species of sea stars (*Pisaster giganteus*, *Patiria miniata*, *Pycnopodia helianthoides*, and *Leptasterias hexactis*) in a general search of the reef (for 30-minutes). When possible, 50-100 *P. ochraceus* were measured (center of disk to tip of longest ray) for size distribution. At three sites (Johnson's Lee, Fossil Reef, and Landing Cove) where *P. ochraceus* were abundant, fixed transects were used as a rough measure of density within that area.

Motile invertebrates (Table 1) were counted in the photo-plots by carefully searching the entire plot. Select species were measured for size frequency distribution. Abundant littorine snails and small limpets were sub-sampled in three small plots (either 20cm x 20cm or 10cm x 10cm, depending on density) within the photo-plot area. This sub-sampling is a shift from previous sub-sampling and is now standardized with other MARINE sampling. Motile invertebrate sampling is usually done in spring, alternating with *Lottia gigantea* counts in fall.

Surfgrass, *Phyllospadix* spp., cover was measured on fixed point-intercept transects (10 m long, 100 points) (three transects per site) at four sites (Trailer, Fraser Cove, East Point, Northwest Talcott) (Figure 4). Special circumstances and general conditions that may have affected sampling were described on daily logs, and reported in the trip reports (Appendix C). Surfgrass transect scoring methods follow the MARINE protocol.

Shorebird and pinniped observations were made on arrival and throughout the day at each site visit. The numbers reported for each species were the greatest number observed at any one time while working at a site. Visitor numbers were reported by concessioners (Island Packers Company and Truth Aquatics) to the park. No independent counts of visitors were made to verify reported figures.

Field work was conducted during low tides, generally below mean low water (minus tides) known as spring tides, as opposed to neap tides. Spring tides occur twice each month but often at night. Sampling dates for the spring and fall seasons were chosen for minus-tide series occurring during daylight hours. Sampling was conducted by Dan Richards, Susie Tharratt and Anna Braswell with assistance from others primarily for data recording and sea star counts. Notes about sampling variations, personnel changes and equipment are documented in trip reports in Appendix C.

Temperature loggers were placed at a number of sites in a cooperative study with PISCO (UCSB). Optic Stowaway temperature loggers from Onset Computer Corporation were placed in PVC (Polyvinyl Chloride) pipe housings strapped to rocks near the mean tide line. Units were downloaded in the field to an Optic Shuttle device and processed with Onset's Boxcar software.

Taxonomy and nomenclature follow Smith and Carlton (1975), Abbott and Hollenberg (1976), McLean (1978), and Morris et al. (1980), with algal nomenclature updated by Paul Silva and Kathy-Ann Miller (<http://ucjeps.berkeley.edu/californiaseaweeds.html>).

Data Analysis

The purpose of this report is to present data collected in 2006. Advanced statistical analysis of the data has not been performed. Any trends presented are simple summary statistics and should be viewed as preliminary. Basic trends of percent cover, averaged by zone, were graphed for key species in photo-plots (acorn barnacles, thatched barnacles, mussels, rockweeds [*Silvetia* and *Hesperophycus*], goose barnacles, red algal turf, and tar) using stock charts in Microsoft Excel. These charts provide a quick view of the cover by season compared to the overall range and mean of values through time for each taxon at each site. To minimize variability, photo-plot target types were not pooled from different zones for analysis. For example, the percent cover of mussels in only mussel zone plots was considered. Descriptive statistics (density, average size, minimum and maximum size), averaged by site, were determined for all fixed owl limpet plots and the trend through time was graphed by sampling event. Readers are cautioned that although densities are provided for comparative purposes, plots were chosen within high density areas and should not be considered as representative of a larger area. Surfgrass trends were plotted for temporal reference.

Photoplots, circular plots, and line transects were all “fixed” or measured in the same location every season. This sampling design reduces natural variability in the system that may obscure important trends in the data. However, it is not possible to extrapolate trends in the plots to the entire site without using additional information specific to the area (Murray *et al.* 2006). Although fixed plots provide better temporal comparison, there are limitations to this design that do not allow a real spatial comparison. Therefore, results from photo-plots, transects, and circular plots should be interpreted with care.

Table 1. Core species, higher taxa, and substrata scored in photo-plots, point intercept transects, circular plots, abalone/seastars, and mobile invertebrate counts at all CINP sites in 2006.

(Target species are shown in bold.)	Photoplots	Surfgrass Transects	Circular Plots	Abalone/ Seastar	Motile Inverts
GREEN ALGAE					
<i>Cladophora columbiana</i>	X				
<i>Ulva/Enteromorpha</i>	X				
Other Green Algae (any greens not listed above)*	X	X			
BROWN ALGAE					
<i>Egregia menziesii</i> (Boa Kelp)	X	X			
<i>Eisenia arborea</i>		X			
<i>Endarachne/Petalonia</i>	X				
<i>Halidrys dioica/Cystoseira</i> spp.		X			
<i>Hesperophycus californicus</i> (= <i>H. harveyanus</i>)	X				
<i>Sargassum muticum</i>		X			
<i>Scytosiphon</i> spp.	X				
<i>Silvetia compressa</i> (= <i>Pelvetia fastigiata</i>)(Rockweed)	X				
Other Brown Algae (any browns not listed above)*	X	X			
Ephemeral browns	X				
RED ALGAE					
<i>Endocladia muricata</i> (Turfweed)	X				
<i>Chondracanthus canaliculatus</i> (= <i>Gigartina canaliculata</i>)	X				
<i>Chondracanthus spinosus</i>	X				
<i>Gelidium coulteri/pusillum</i>	X				
<i>Mastocarpus papillatus</i> (blade)	X				
<i>Mazzaella affinis</i> (= <i>Rhodoglossum affine</i>)	X				
<i>Mazzaella</i> spp. (= <i>Iridaea</i> spp.)	X				
<i>Porphyra</i> spp.	X				
<i>Prionitis</i> spp.	X				
Articulated Corallines (Erect Corallines)	X	X			
Crustose Corallines (Encrusting Corallines)	X	X			
Other Red Algae (any reds not listed above)*	X	X			
ALGAE/PLANTS					
<i>Phyllospadix scouleri/torreyi</i> (Surfgrass)	X	X			
Non-Coralline Crusts (reds and browns)	X	X			
Other Plant/Algae*		X			
ANEMONES					
<i>Anthopleura elegantissima/sola</i> (Green Anemone)	X	X			
POLYCHAETE WORMS					
<i>Phragmatopoma californica</i>	X	X			

Table 1. Core species, higher taxa, and substrata scored in photo-plots, point intercept transects, circular plots, abalone/sea stars, and mobile invertebrate counts at all CINP sites in 2006 (continued).

(Target species are shown in bold.)	Photoplots	Surfgrass Transects	Circular Plots	Abalone/ Seastar	Motile Inverts
MOLLUSKS					
<i>Acanthina</i> spp.					X
Chitons	X				X
<i>Fissurella volcano</i>					X
<i>Haliotis cracherodii</i> (Black Abalone)				X	
<i>Lepidochitona hartwegii</i>					X
<i>Littorina</i> spp.					X
<i>Lottia gigantea</i> (Owl Limpet)			X		X
<i>Mopalia</i> spp.					X
<i>Mytilus californianus</i> (California Mussel)	X	X			
<i>Nucella emarginata</i>					X
<i>Nuttallina</i> spp.					X
<i>Ocenebra circumtexta</i>					X
<i>Tegula funebris</i>					X
<i>Tegula gallina</i>					X
<i>Tegula</i> spp.	X				
Limpets	X				
Large Limpets > 15mm (excluding <i>L. gigantea</i>)					X
Medium Limpets 5-15mm					X
Small Limpets < 5mm					X
<i>Littorina</i> spp.	X				X
<i>Septifer/Brachydontes</i>	X				
BARNACLES					
<i>Chthamalus dalli/fissus</i> & <i>Balanus glandula</i>	X				
(Acorn Barnacle)					
<i>Tetraclita rubescens</i> (Thatched Barnacle)	X				
<i>Pollicipes polymerus</i> (Goose Barnacle)	X				
Barnacles*		X			
Other Barnacles (any barnacles not listed above)*	X				
ECHINODERMS					
<i>Pisaster ochraceus</i> (Ochre Star)	X	X		X	X
<i>Pisaster giganteus</i>				X	X
<i>Patiria miniata</i>				X	X
<i>Strongylocentrotus purpuratus</i>					X
CRUSTACEANS					
<i>Pachygrapsus crassipes</i>					X
<i>Pagurus</i> spp.					X
INVERTEBRATES					
Other Invertebrates (Other Animals) (any inverts not listed above)*	X	X			
SUBSTRATES					
Rock (Bare Rock)	X	X			
Sand	X	X			
Tar	X	X			
UNDETERMINED					
Unidentified (cannot tell if plant, invert or substrate)	X	X			
* The specific definitions of these categories are different for photoplots compared to transects.					

Results and Discussion

2006 Sampling Events

We sampled all 21 sites at least once in 2006 (Table 2). The spring sampling was reduced for a number of reasons including: restricted access due to nesting of endangered California Brown pelicans (on Santa Barbara Island), harbor seals with pups present (Cat Rock), weather and other logistical constraints, or administrative reasons. In fall 2006, we made visits to all five islands, including 20 of the 21 monitoring sites.

Table 2. 2009 Sampling dates for Rocky Intertidal Monitoring sites (Ns=not sampled).

Site	Site Codes	Spring	Fall
Cuyler Harbor, SMI	SMCH	Ns	1/16/07
Crook Point, SMI	SMCP	Ns	1/19/07
Otter Harbor, SMI	SMOH	Ns	1/17/07
Harris Point, SMI	SMHP	Ns	1/18/07
Fossil Reef, SRI	SRFR	Ns	12/1/06
Johnson's Lee, SRI	SRJL	Ns	12/4/06
Ford Point, SRI	SRFP	Ns	11/30/06
Northwest-Talcott, SRI	SRNWT	Ns	12/2/06
East Point, SRI	SREP	Ns	12/3/06
Fraser Cove/Forney Cove, SCI	SCFC	Ns	12/18-19/06
Trailer, SCI	SCTR	Ns	12/19/06
Willows Anchorage, SCI	SCWA	Ns	12/20/06
Scorpion Rock, SCI	SCSR	3/25/06	Ns
Prisoner's Harbor, SCI	SCPH	Ns	12/17/06
Orizaba Cove, SCI	SCOC	3/27/06	1/3/07
Cat Rock, ANI	ANCR	Ns	11/20/06
South Frenchy's Cove, ANI	ANSFC	3/28/06	11/22/06
Middle Anacapa-West	ANMW	3/26/06	11/21/06
Middle Anacapa-East	ANME	3/26/06	11/21/06
Landing Cove, SBI	SBLC	Ns	11/2,3,6,/06
Sealion Rookery, SBI	SBSLR	Ns	11/4,5/06

Photoplots

Photo-plot data are summarized in Figures 4-6 for each target zone and season. Mean percent cover is pooled for all replicate plots per zone by site and season, and is compared to the range and mean cover across all years. Percent cover values of core taxa in each plot are presented in Appendix B. Summary tables (by zone) for each site can be found in the trip reports (Appendix C).

In the fall 2006 sample, we saw a huge recruitment of *Chthamalus* sp. at Anacapa, Santa Rosa, and Santa Barbara Islands (Figure 5). Barnacle cover in plots at Santa Barbara was still below the long-term mean, despite the recruitment, due to the sea lion trampling there. Some plots at Anacapa Island seemed to have nearly solid *Chthamalus* sp. cover (Figure 2). Cat Rock had the highest cover of barnacles since monitoring began in 1982. Some sites on Santa Cruz and San

Miguel Islands also received high recruitment of *Chthamalus* sp. Variation was high however as barnacle cover measured below the long-term mean at Middle Anacapa East, Prisoner's Harbor and the two Santa Barbara Island sites. At Landing Cove on Santa Barbara Island, *Chthamalus* dominated one plot but others were dominated by *Ulva*, *Gelidium/Pterocladia*, or even *Mytilus* and *Tetraclita*. Thatched barnacles, *Tetraclita rubescens*, are only sampled at three sites; in 2006, cover was near the long-term mean at Orizaba Cove and Harris Point but below average at Scorpion Rock (Figure 6).



Figure 2. Dense recruitment of *Chthamalus* sp. in *Chthamalus/Balanus* zone plot 135 at Cat Rock, Anacapa, fall 2006.

Turfweed, *Endocladia muricata*, cover was variable with several sites having much higher than average cover and most others near or below average (Figures 4 and 5). In spring 2006, *E. muricata* cover at Scorpion Rock reached record-high percentages (Figure 4). *Endocladia* at Sea Lion Rookery was scarcely present at 3-5 % cover and thalli were small. *Ulva* sp. dominated the plots there perhaps due to the constant presence of sealions trampling the reef. At Prisoner's Harbor, extremely dense patches of *Scytosiphon dotyii* partially obscured some of the *E. muricata* on the western end of the reef.

Silvetia compressa cover was well below the long-term mean at most sites and was nearly missing in plots at Landing Cove and Crook Point. Rockweeds in general have been on a multi-year decline at most sites, though *Hesperophycus californicus* tends to be a little more variable. Harris Point, which has different (short) form of *Hesperophycus*, was the only site to show an increase in cover of rockweed. The other sites were at or lower than the long-term mean (Figure 6). Trailer, Fossil Reef, and Northwest-Talcott were the only sites to be at or above the long-term

mean for *S. compress* cover (Figure 5). At Sea Lion Rookery, *S. compressa* was common in four of the *Silvetia* zone plots (30-59% cover), but the fifth plot was dominated by *Mytilus californianus* and *Tetraclita rubescens*.

The *Gelidium/Pterocladia/Chondracanthus* zone, also known as red-algal turf, was below the long-term mean again in 2006, in large part due to two plots being dominated by *Phyllospadix* sp. (Figure 6). A low dense layer of *Phragmatopoma californica* covered the rhizomes of the *Phyllospadix*.

Mytilus californianus cover was above the long-term mean at ten sites, continuing the trend seen during the last two years (Figure 5). Cover of *M. californianus* reached record levels this year at Landing Cove, Sea Lion Rookery, Prisoner's Harbor and Fraser Cove. Mussel cover at Trailer was still below the mean but it had improved greatly from an all-time low occurring there last year. Small mussels were reported, but we did not note especially high recruitment. The vermetid gastropod, *Petalochonchus montereyensis*, was observed in the mussel zone again this year at Orizaba Cove. *P. montereyensis* are found at other sites, especially Fossil Reef; however, they are not found in the mussel plots there. *Mytilus gallo-provincialis*, an introduced mussel commonly known as the bay mussel, was found at Scorpion Rock. They are occasionally found at the islands and generally do not persist along the open coast. *M. californianus* cover at Sea lion Rookery was nearly 100% and *Pollicipes polymerus* covered most of the rest of the area.

South Frenchy's Cove had high levels of sand. The rocky reef there normally stands at least 50-80 cm above the sand, but measured only 32 cm during the fall sample. The sand level was 45 cm below the reef in spring. Several of the plots had a light coating of sand.

The highest sand levels we have ever observed at Johnson's Lee were seen in December. Several of the photoplots were completely buried by thick sand estimated to be at least 10 to 30 cm deep (Figure 3). The large pool in the center of the site was completely buried. Sand scour was suspected in some of the *Endocladia* zone plots and two mussel zone plots on the lower reef were partially covered with sand.



Figure 3. High sand levels in December 2006 impacted plots at Johnson's Lee. *Endocladia* zone plot 509 is normally almost a meter above the sand level, and barnacle zone plot 504 nearby is buried under several centimeters of sand.

Caulacanthus ustulatus is an invasive species of algae first found in 2005 at Middle-East Anacapa Island. In 2006, there did not appear to be much spread beyond the original location around plot 53. However, small patches of the invasive alga were found at Middle West and many more patches of it were found at the nearby abalone monitoring area, Harbor Seal Arch. Interestingly, *Sargassum muticum*, an invasive brown alga that has been on the west coast for about 40 years, was quite abundant at Harbor Seal Arch.

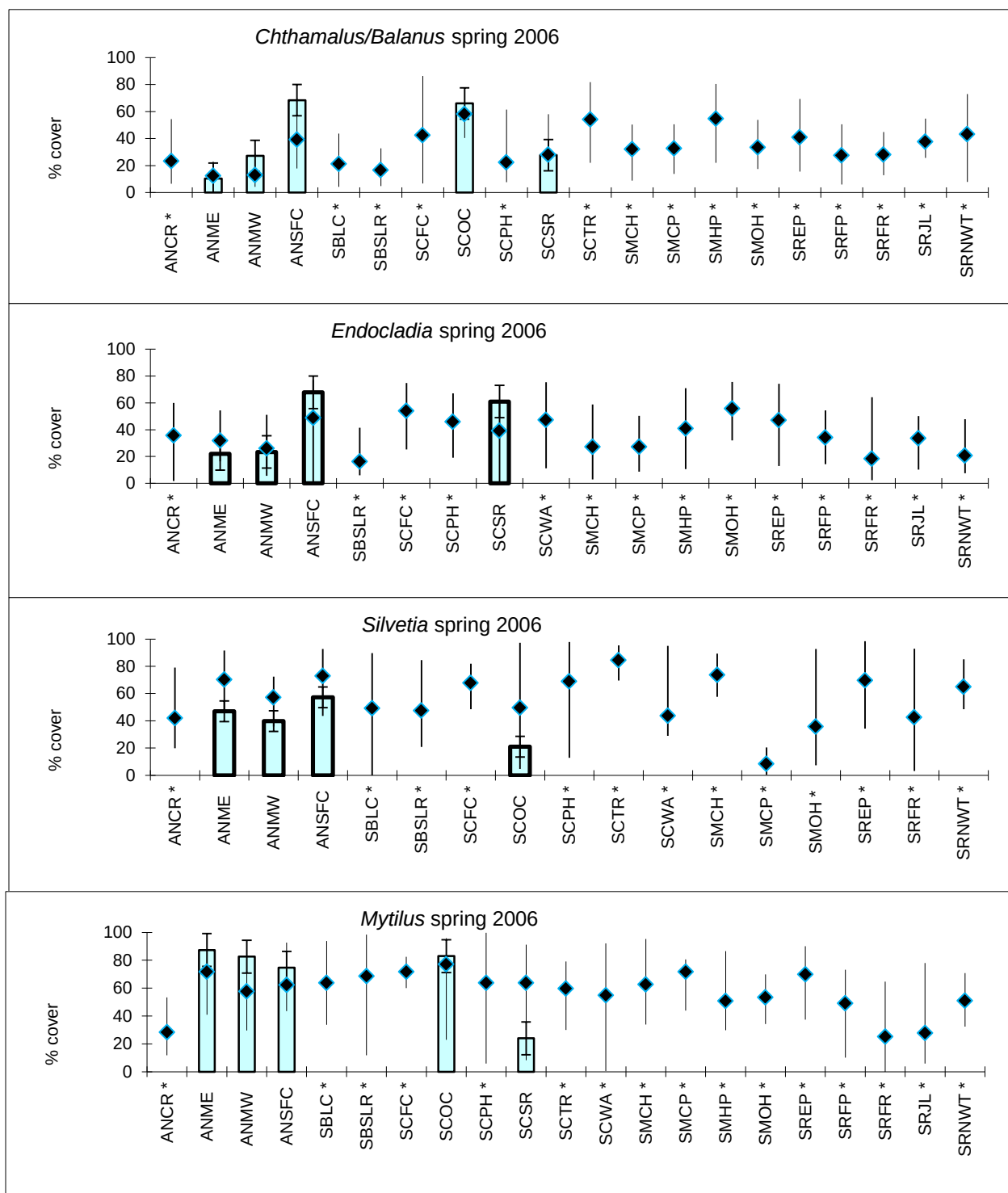


Figure 4. Percent cover of target species (*Chthamalus/Balanus*, *Endocladia muricata*, *Silvetia compressa* and *Mytilus californianus*) in fixed plots by zone in spring 2006. Bars represent the seasonal mean percent cover from five plots within that zone; error bars represent ± 1 standard error of the plot abundances at that site. Vertical lines represent the range of means since monitoring began at that site. Diamonds represent the overall mean for all years at that site. See table 2 for site codes. Asterisks indicate no sample.

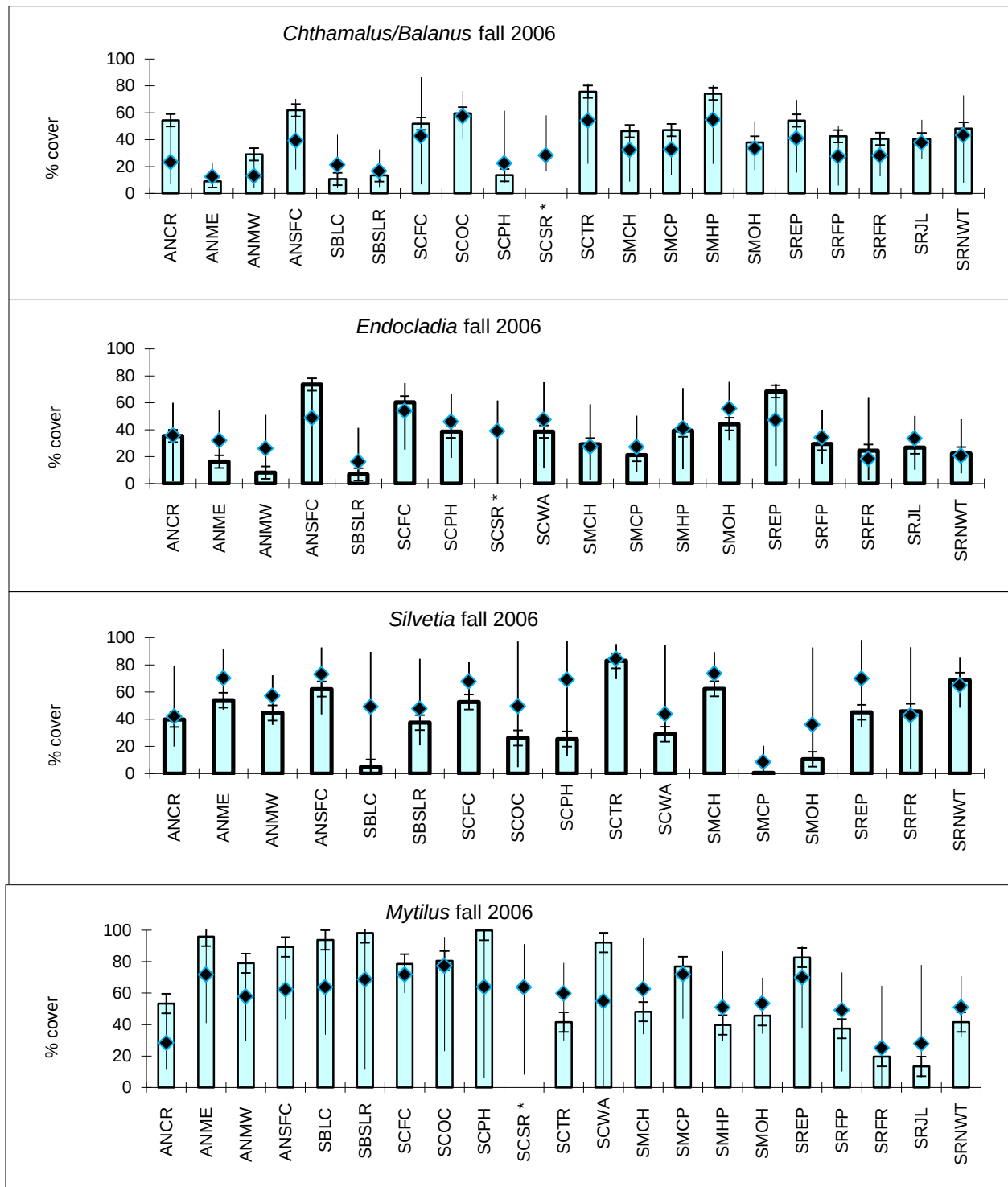


Figure 5. Percent cover of target species (*Chthamalus/Balanus*, *Endocladia muricata*, *Silvetia compressa* and *Mytilus californianus*) in fixed plots by zone in fall 2006. Bars represent the seasonal mean percent cover from five plots within that zone; error bars represent ± 1 standard error of the plot abundances at that site. Vertical lines represent the range of means since monitoring began at that site. Diamonds represent the overall mean for all years at that site. See table 2 for site codes. Asterisks indicate no sample.

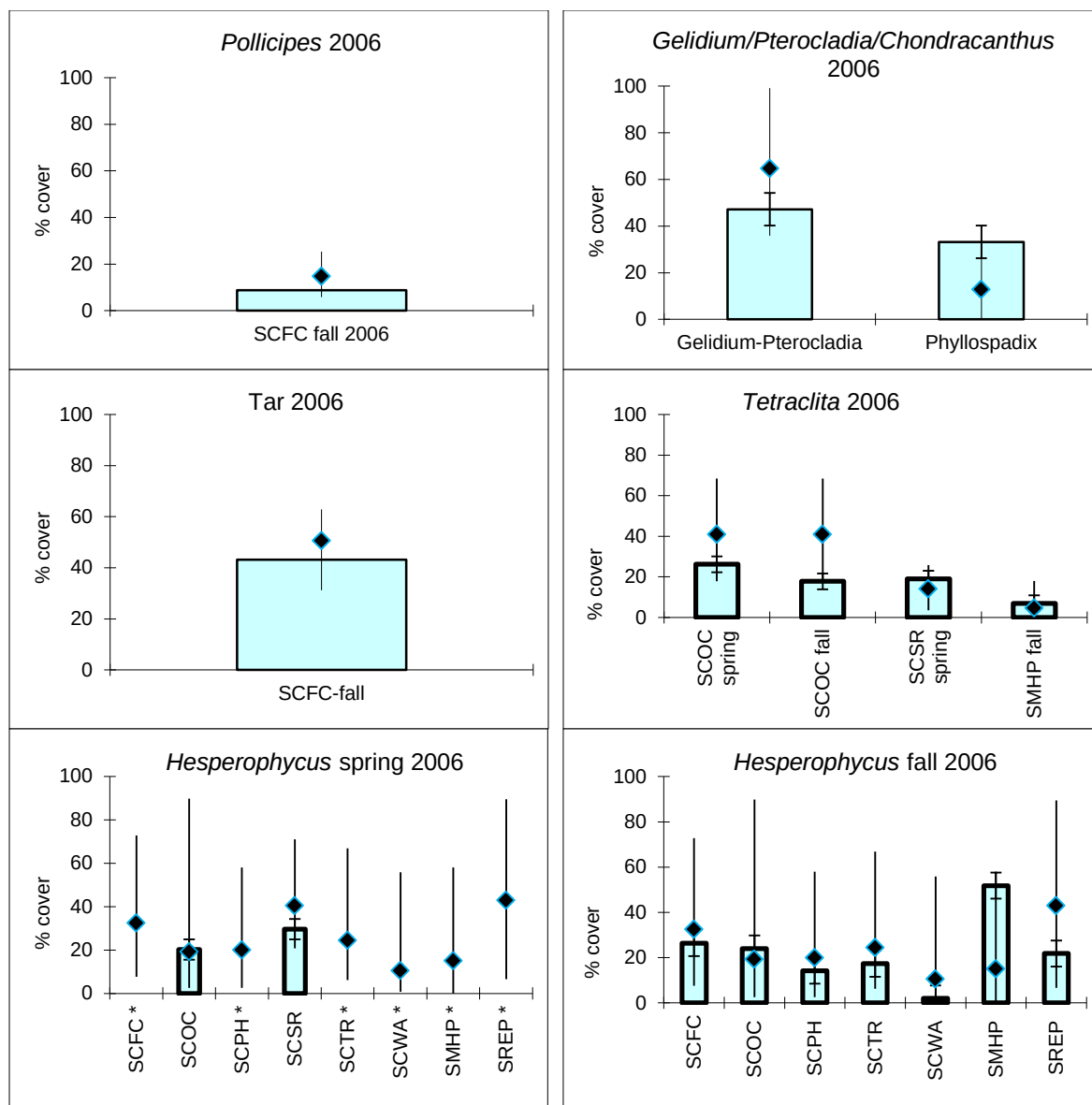


Figure 6. Percent cover of target taxa (*Pollicipes polymerus*, Red algal turf, Tar, *Tetraclita rubescens*, and *Hesperophycus californicus*) in fixed plots by zone in 2006. Bars represent the seasonal mean percent cover from five plots within that zone. Vertical lines represent the range of means since monitoring began at that site. Horizontal tick marks represent the overall mean for all years at that site. See table 2 for site codes. Asterisks indicate no sample.

Motile Invertebrates

Select motile invertebrate species have been counted, and a subset of species, have been measured within photoplots at nearly all sites (excluding Middle Anacapa East) annually since 2000. Figures 7-10 display abundances for two to four of the most commonly encountered species in the barnacle, *Endocladia*, *Silvetia* and mussel zones at each site. Counts and measurements were also conducted for motile invertebrate species occurring in photoplots established within other zones (e.g. *Tetraclita*, *Pollicipes*, *Hesperophycus*, *Tar*), but are not presented in this report.

The most common motile invertebrates counted within the barnacle plots are typically *Littorina* spp. and small (< 5 mm) and medium-sized (5-15 mm) limpets. Counts for each of these groups have fluctuated markedly at most sites over the years. In 2006, abundances for all three groups (particularly small-sized limpets) reached all-time highs at many sites (Figure 7). Nine sites (Anacapa Middle West, Cat Rock, Cuyler Harbor, East Point, Fossil Reef, Harris Point, Landing Cove, Prisoner's Harbor and South Frenchy's Cove) had more small-sized limpets this year than any previous year. *Littorina* spp. were more abundant in 2006 compared with earlier samples at East Point, Fossil Reef, Landing Cove and Sea Lion Rookery. Medium-sized limpets reached record high abundances at Sea Lion Rookery and to a lesser degree at Fraser Cove and Scorpion Rock. Record-low densities only occurred for *Littorina* spp. at Cat Rock, Fraser Cove and South Frenchy's Cove as well as for medium-sized limpets at Cat Rock, Ford Point and Landing Cove.

Endocladia plots are typically within close spatial proximity to barnacle plots and usually have high numbers of *Littorina* spp. and small (< 5 mm) and medium-sized (5-15 mm) limpets. Record-high abundances of small-sized limpets were measured at Anacapa Middle West, Cat Rock, East Point, Fraser Cove (slightly), Fossil Reef and Sea Lion Rookery. Only one site (Fossil Reef) had more *Littorina* spp. this year than earlier years (Figure 8). Extreme abundances were not observed for medium-sized limpets at any site this year, but record-low densities were measured at Cat Rock, Fossil Reef, South Frenchy's Cove and Willows Anchorage. The lowest numbers of *Littorina* spp. were seen at Anacapa Middle West, Fraser Cove (slightly), Otter Harbor, Scorpion Rock and South Frenchy's Cove compared to previous years. Record-low abundances were not measured for small-sized limpets at any site in 2006.

Silvetia plots commonly have high numbers of chitons (*Lepidochitona* spp.), turban snails, (*Tegula funebris*), and small- (< 5 mm) and medium-sized (5-15 mm) limpets among other taxa. This year, small-sized limpets were particularly abundant compared with previous years (Figure 9). Record-high densities were recorded at seven sites (Anacapa Middle West, Cat Rock, Cuyler Harbor, Fossil Reef, Fraser Cove, Northwest-Talcott and Trailer). *T. funebris* were more abundant at Fossil Reef, Otter Harbor, Prisoner's Harbor and Trailer in 2006 than earlier years. Other species commonly associated with *Silvetia* plots, *Lepidochitona* spp. and medium-sized limpets, did not reach record-high densities at any sites this year, but some of the lowest abundances were observed at several sites, particularly for medium-sized limpets. The sites that had record-low abundances for medium-sized limpets include Cat Rock, Crook Point, East Point, Fossil Reef, Landing Cove and Willows Anchorage. Additionally, record-low abundances were measured at Landing Cove and Cuyler Harbor for small-sized limpets and *Lepidochitona* spp., respectively.

Mytilus plots can support a diverse assemblage of motile invertebrates, but typically have consistent numbers of chitons (*Nuttallina* spp.) and dogwinkle snails (*Nucella emarginata*). Compared with past seasons, more *Nuttallina* spp. were counted at Otter Harbor and Scorpion Rock (Figure 10). The most *N. emarginata* were seen this year at Prisoner's Harbor and Scorpion Rock compared with previous years. Record-low abundances occurred for *Nuttallina* spp. at Cat Rock, East Point, Johnson's Lee, Northwest-Talcott and Prisoner's Harbor and *N. emarginata* at Cuyler Harbor, East Point, Fraser Cove and Johnson's Lee.

Size frequency data for select motile invertebrate taxa are presented in Figures 11-14. Measurements appear to be similar to those recorded in previous years, but further analysis is needed to draw any inferences among sites.

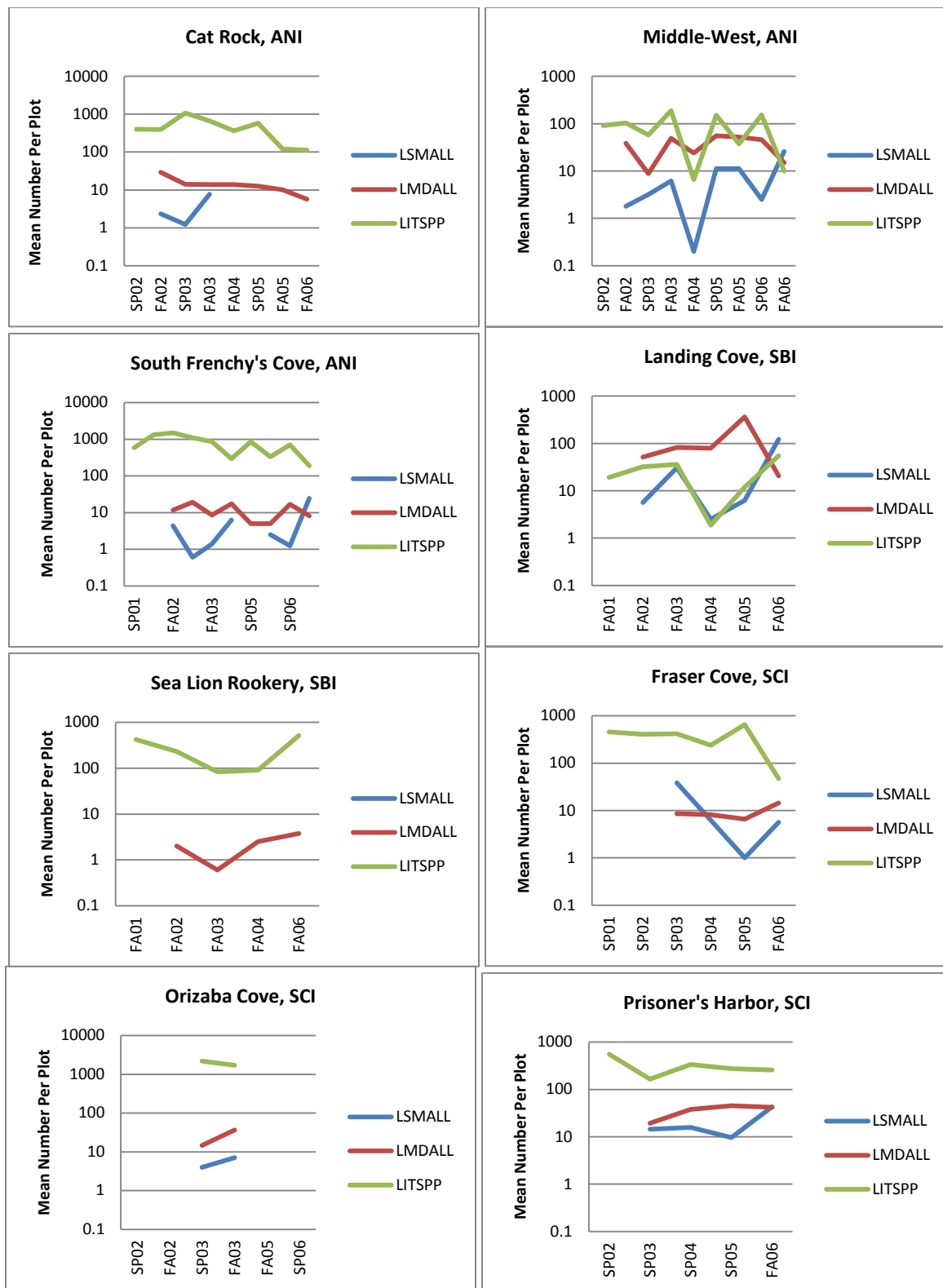


Figure 7. Common motile invertebrates in barnacle plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSP= *Littorina* spp.).

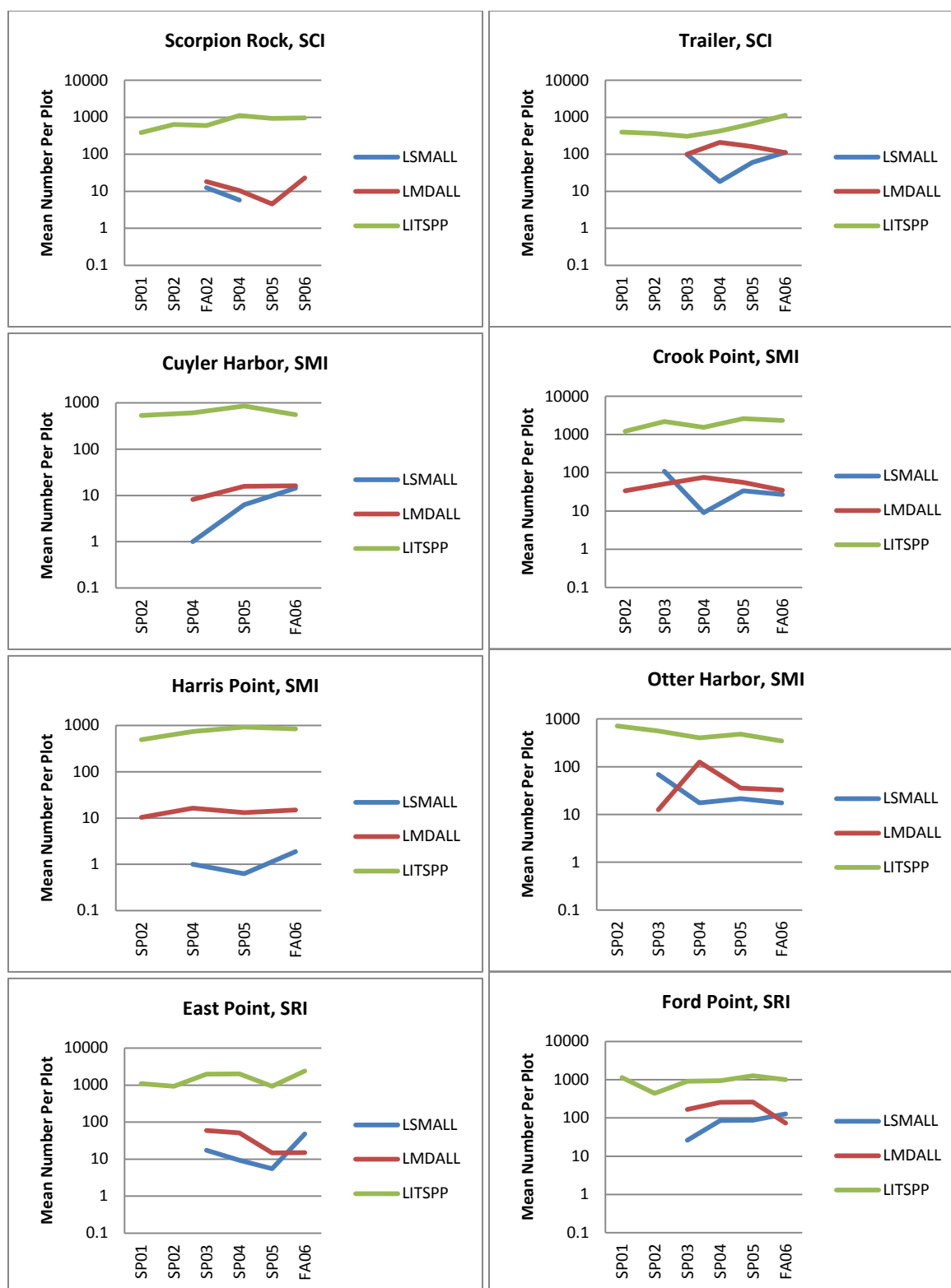


Figure 7. Common motile invertebrates in barnacle plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSPP= *Littorina* spp.) (Continued).



Figure 7. Common motile invertebrates in barnacle plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSPP= *Littorina* spp.) (Continued).

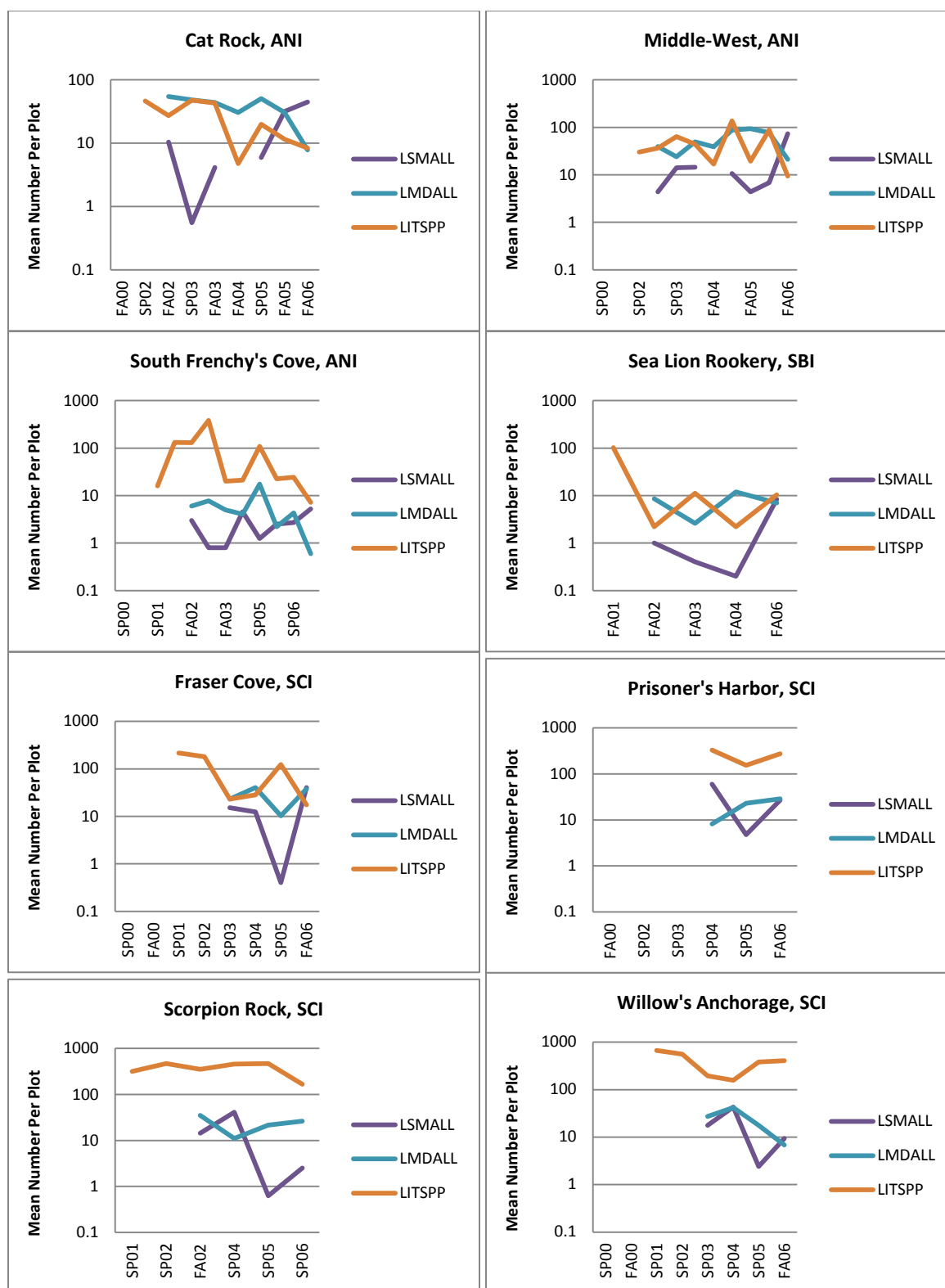


Figure 8. Common motile invertebrates in *Endocladia* plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSPP= *Littorina* spp.).

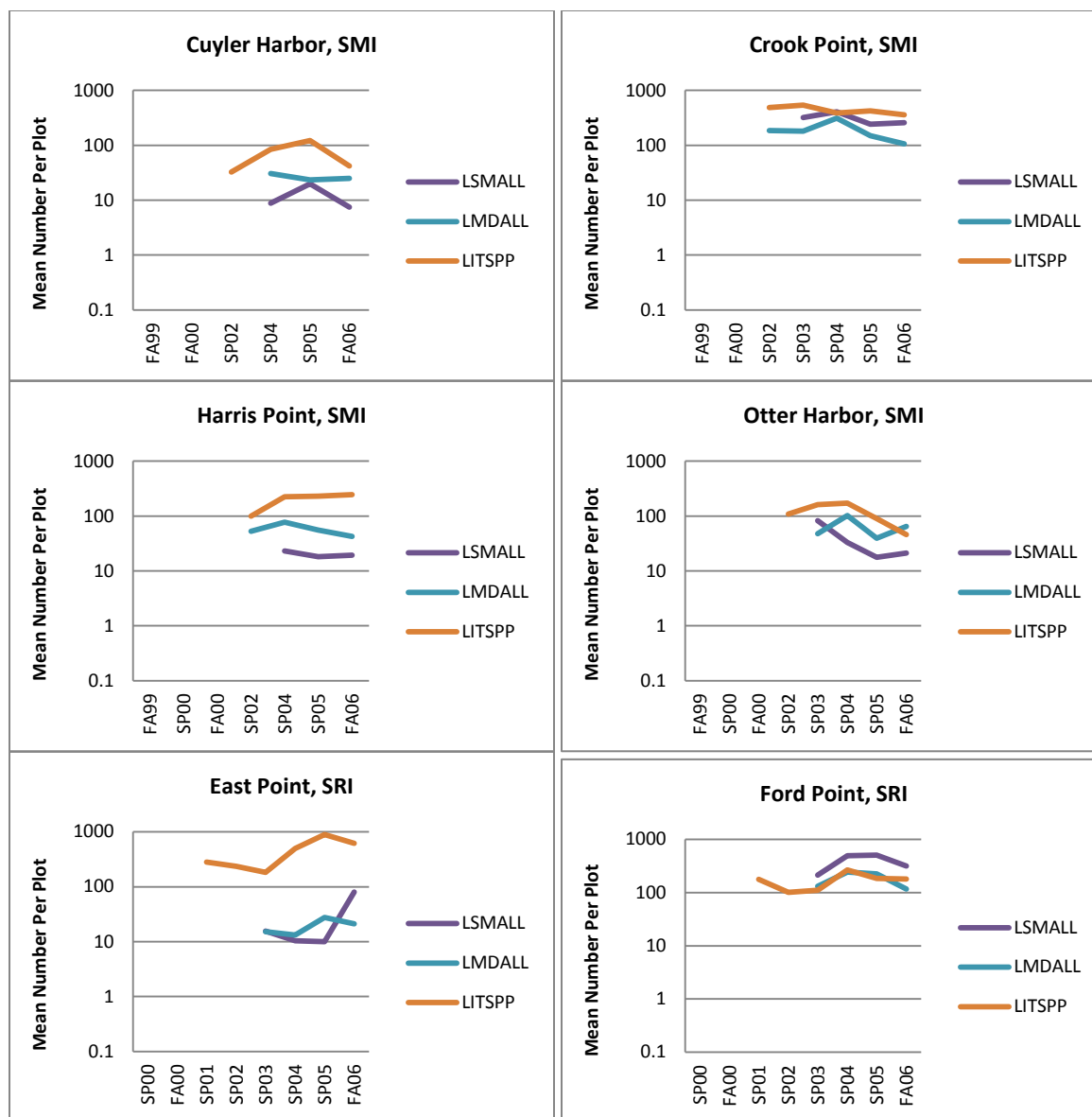


Figure 8. Common motile invertebrates in *Endocladia* plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSP= *Littorina* spp.) (Continued).

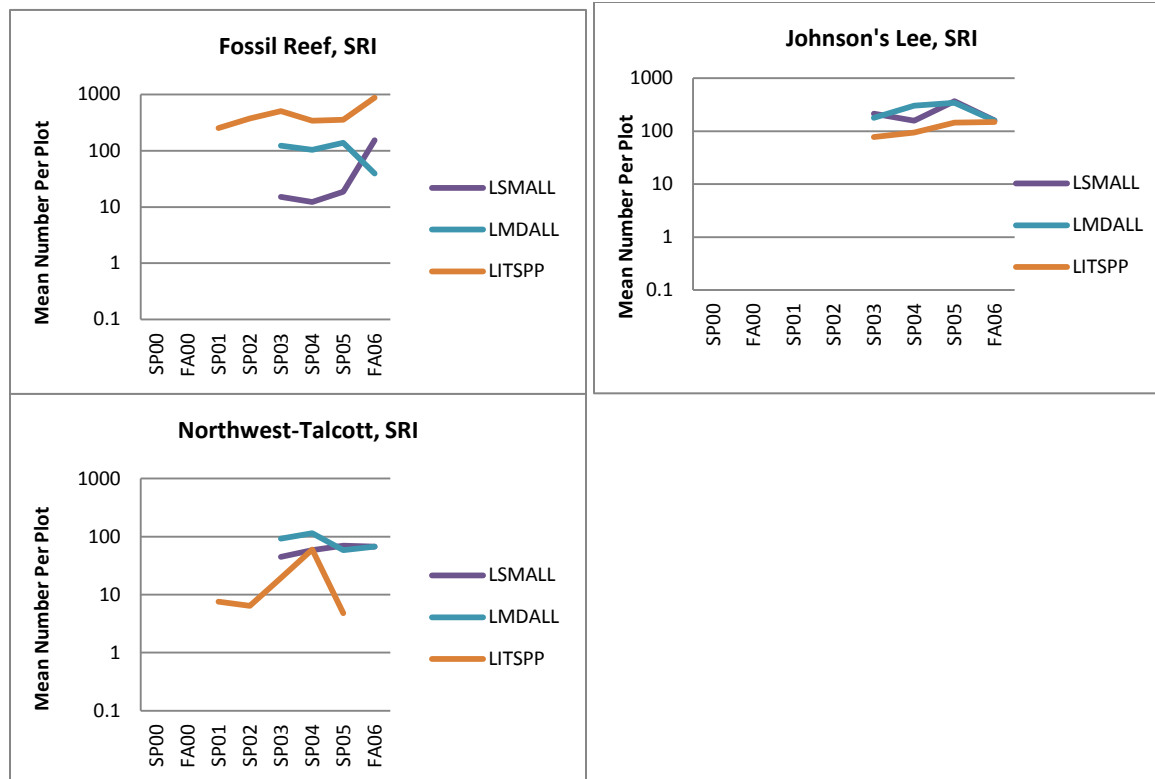


Figure 8. Common motile invertebrates in *Endocladia* plots. Note log scale and variation in scale among plots. (LSMALL= small-sized limpets, LMDALL= medium-sized limpets, LITSPP= *Littorina* spp.) (Continued).

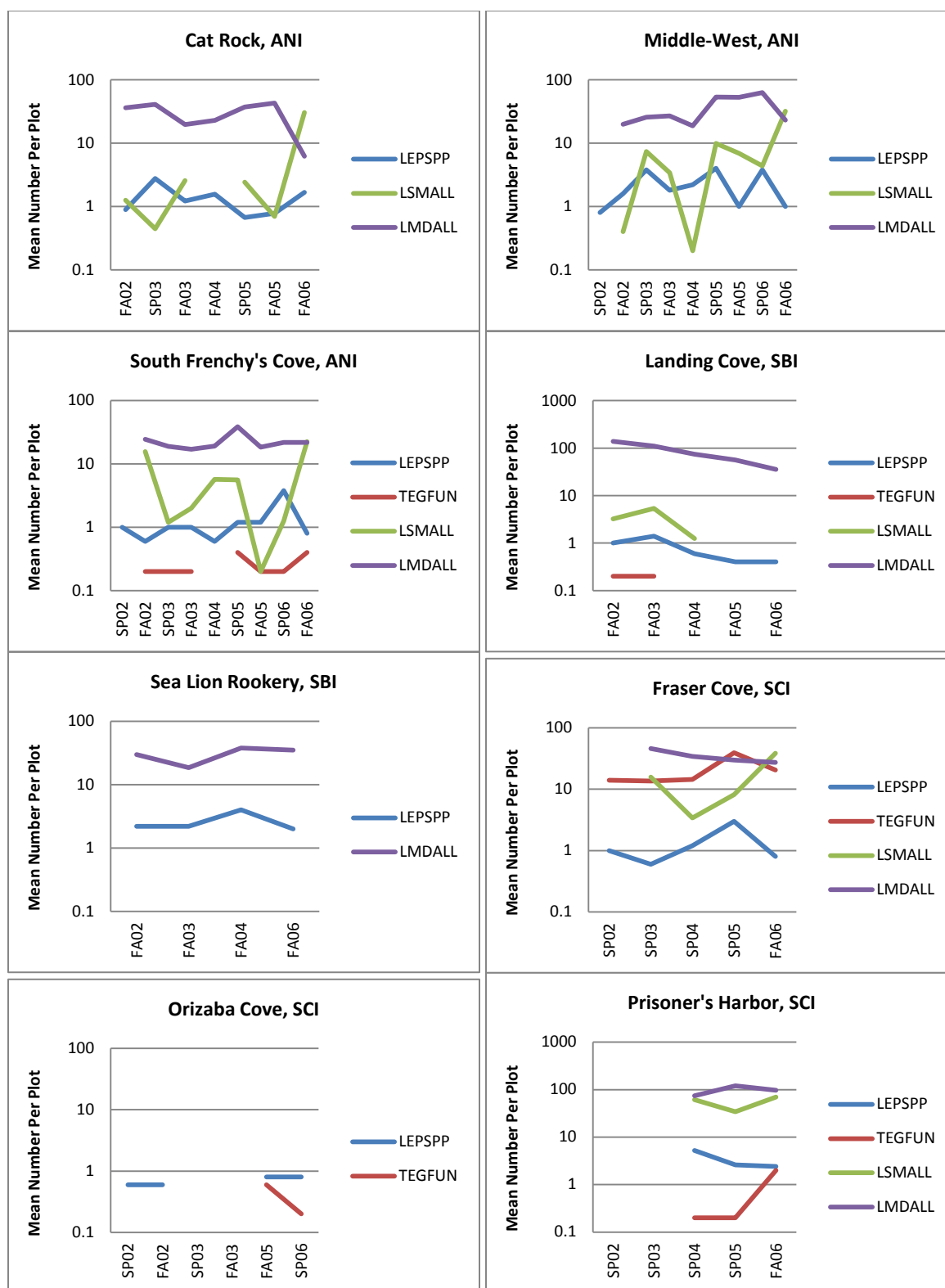


Figure 9. Common motile invertebrates in *Silvetia* plots. Note log scale and variation in scale among plots. (LEPSPP= *Lepidochitona* spp., TEGFUN= *Tegula funebris*, LSMALL= small-sized limpets, LMDALL= medium-sized limpets).

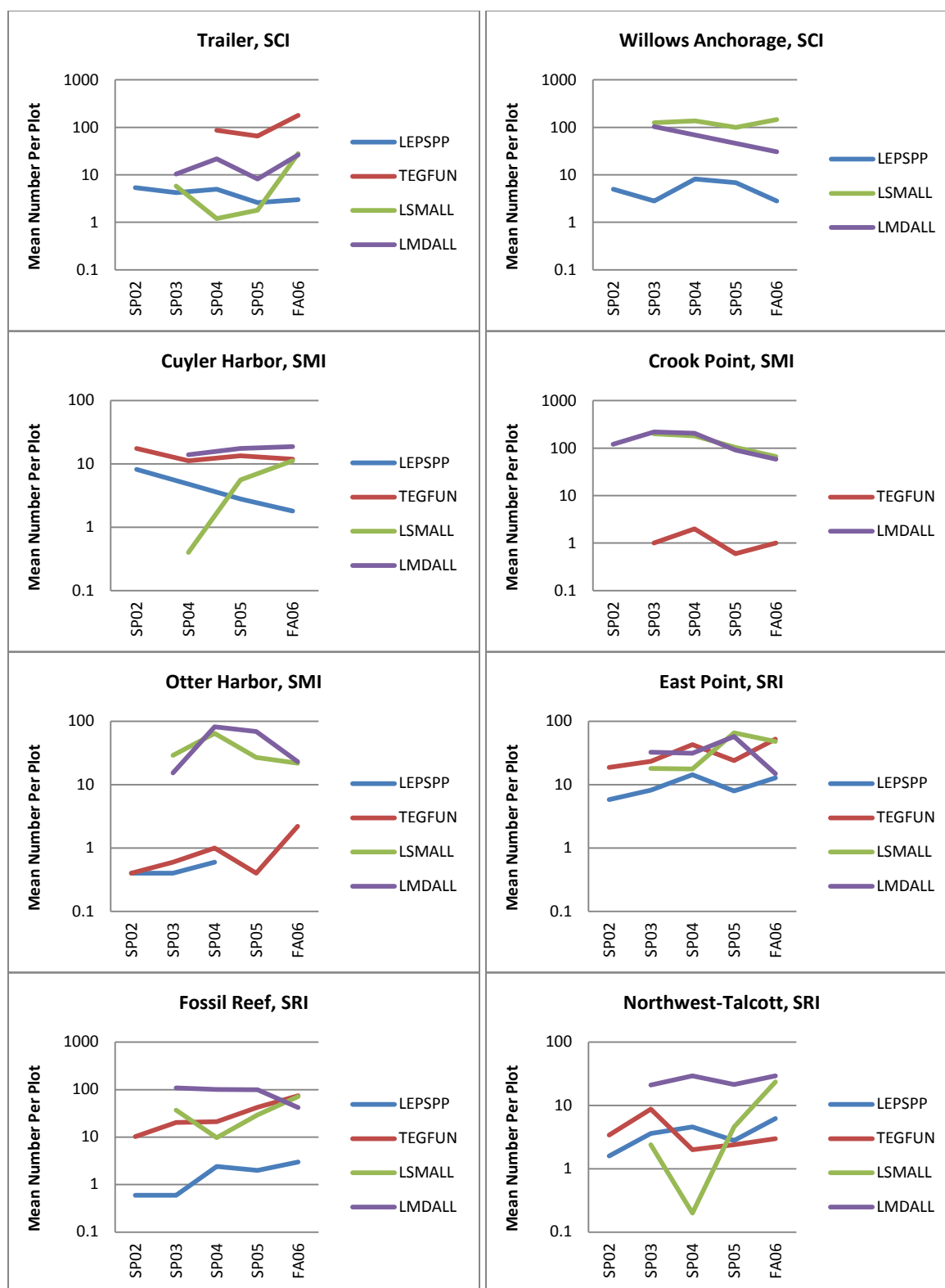


Figure 9. Common motile invertebrates in *Silvetia* plots. Note log scale and variation in scale among plots. (LEPSPP= *Lepidochitona* spp., TEGFUN= *Tegula funebris*, LSMALL= small-sized limpets, LMDALL= medium-sized limpets) (Continued).

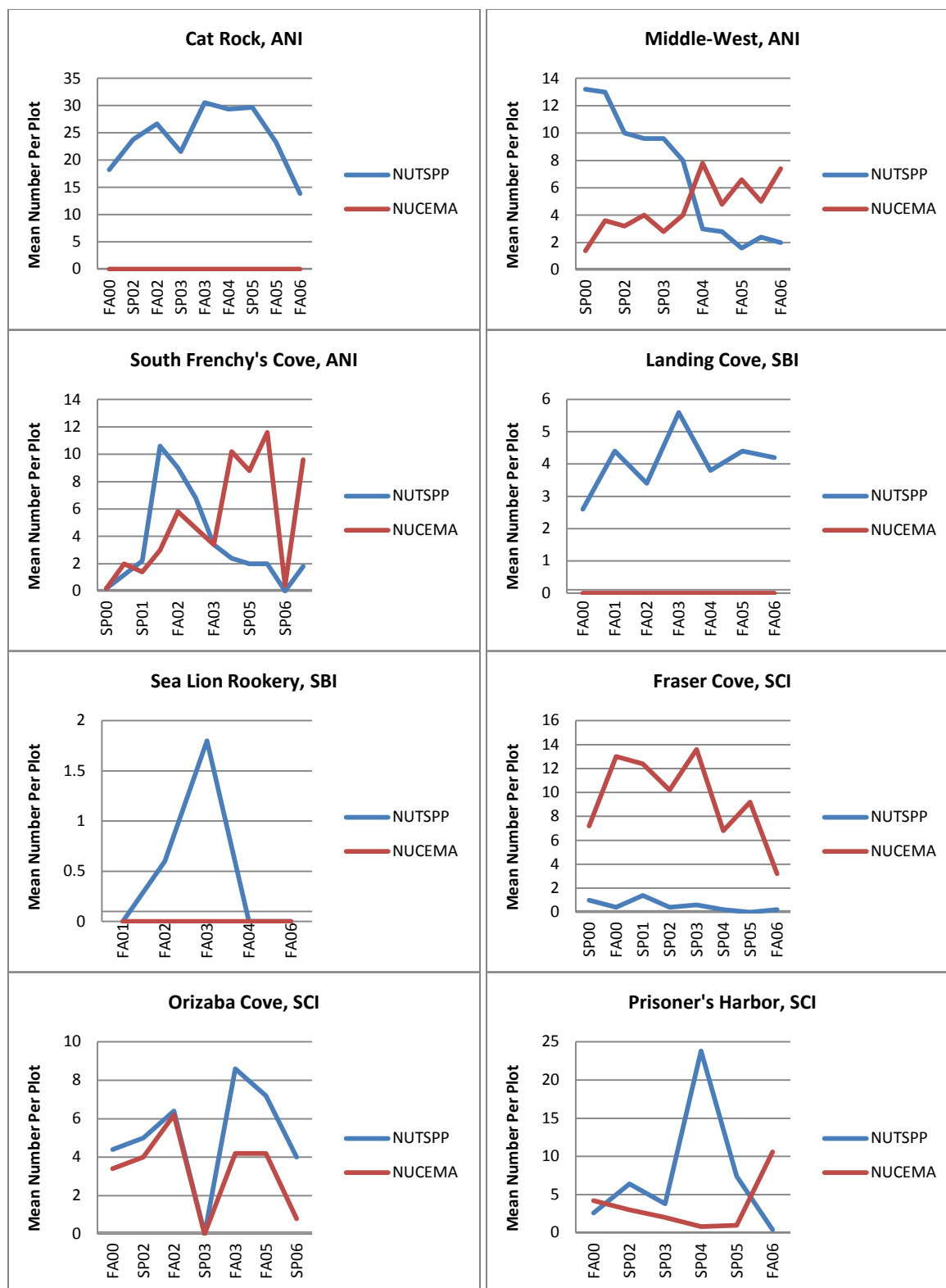


Figure 10. Common motile invertebrates in *Mytilus* plots. Note variation in scale among plots. (NUTSPP= *Nuttallina* spp., NUCEMA= *Nucella emarginata*).

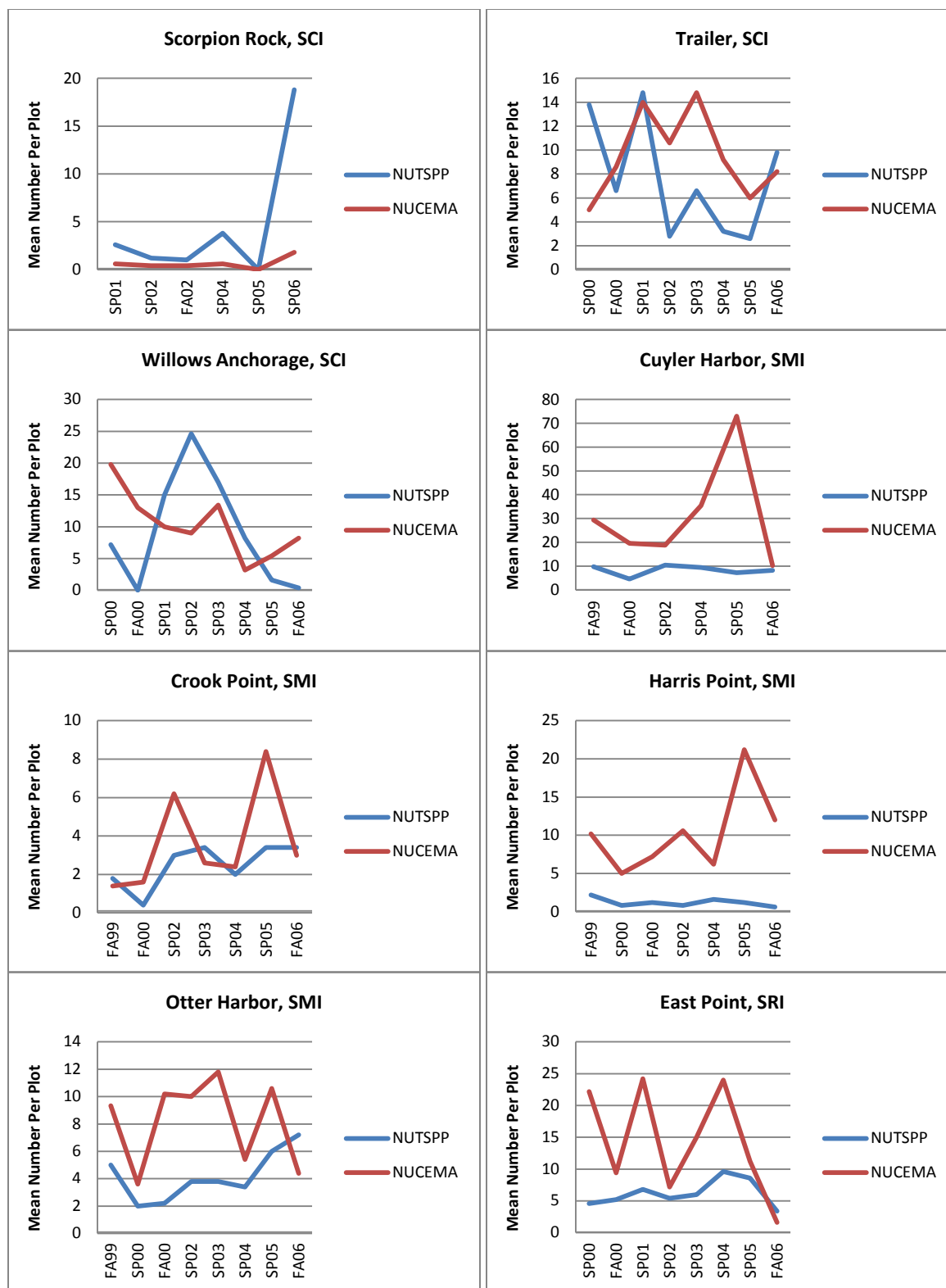


Figure 10. Common motile invertebrates in *Mytilus* plots. Note variation in scale among plots. (NUTSPP= *Nuttallina* spp., NUCEMA= *Nucella emarginata*) (Continued).

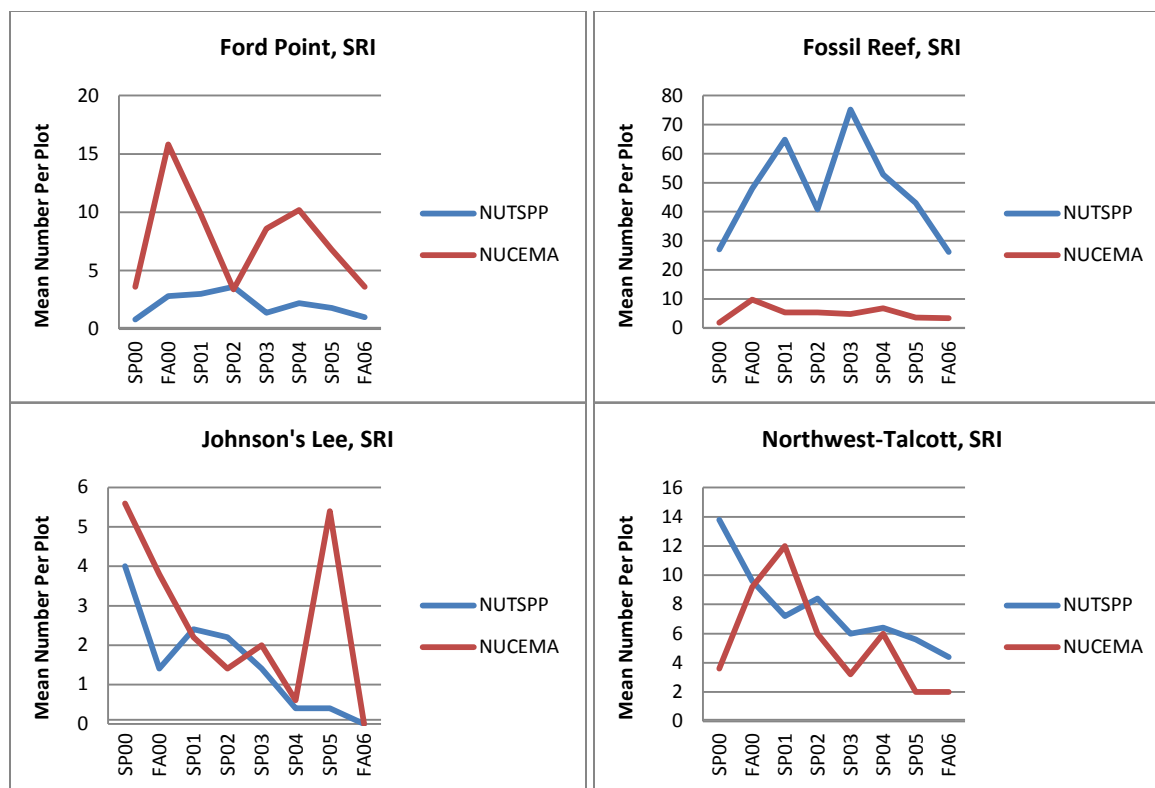


Figure 10. Common motile invertebrates in *Mytilus* plots. Note variation in scale among plots. (NUTSPP= *Nuttallina* spp., NUCEMA= *Nucella emarginata*) (Continued).

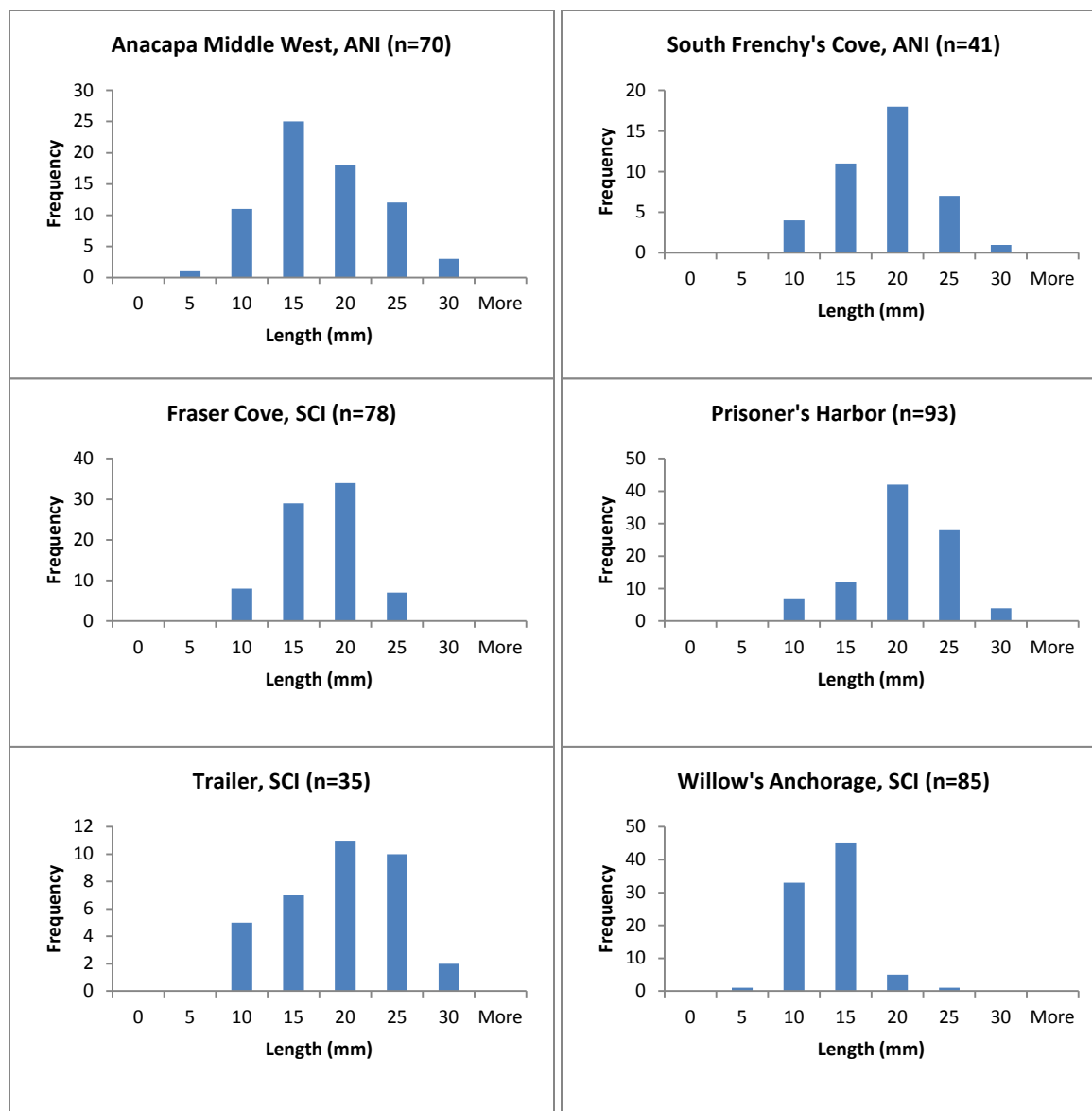


Figure 11. *Nucella emarginata/ostrina* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Nucella*.

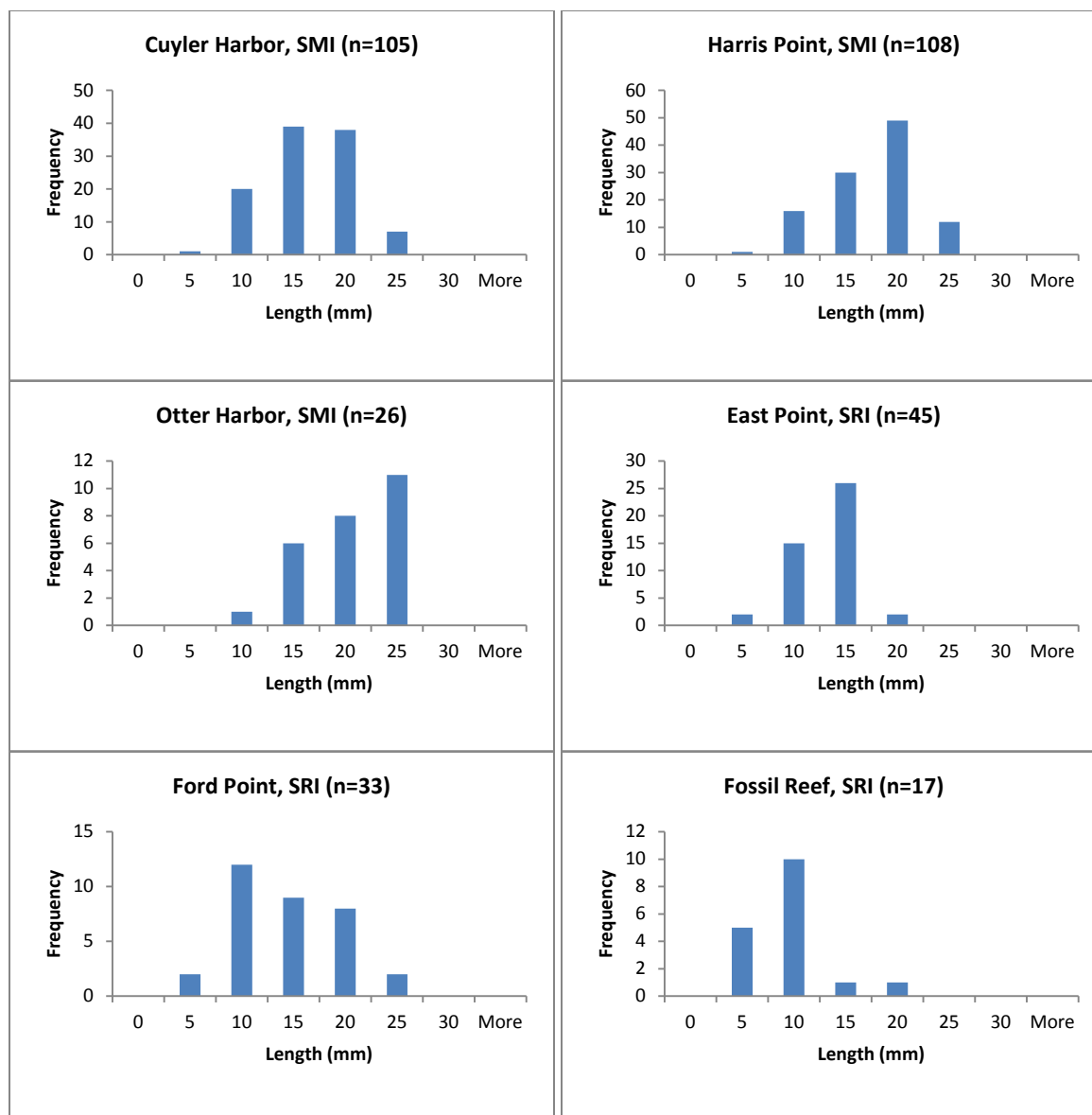


Figure 11. *Nucella emarginata/ostrina* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Nucella* (continued).

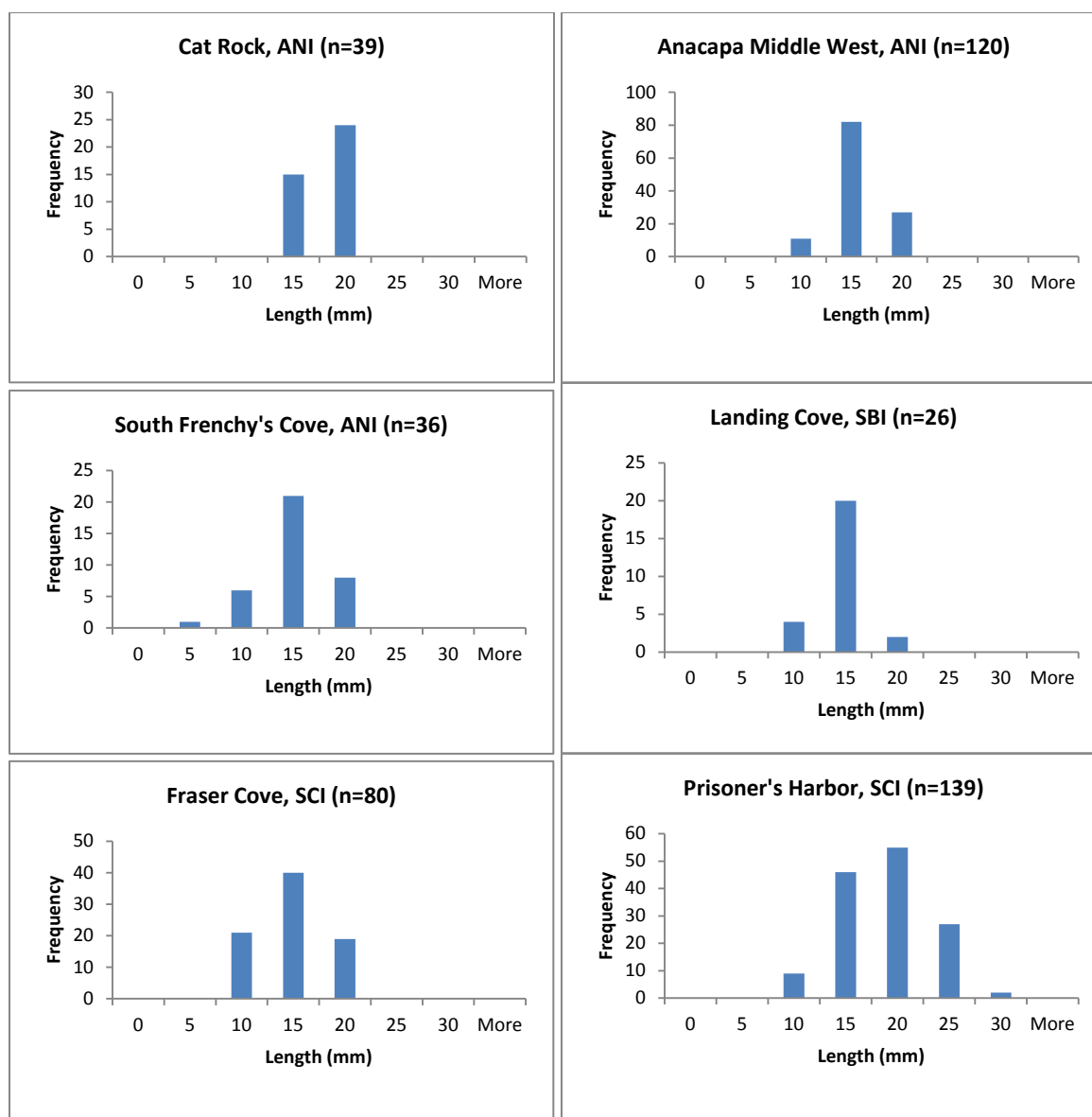


Figure 12. *Acanthina* spp. size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Acanthina*.

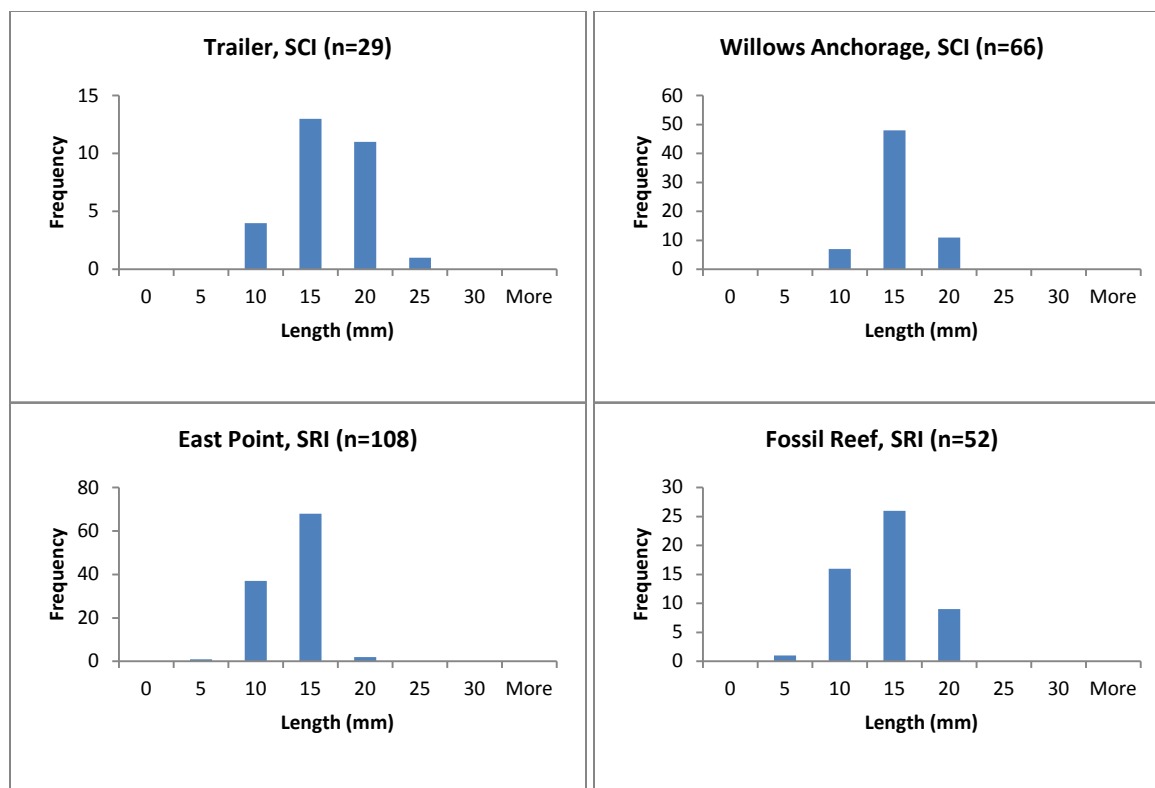


Figure 12. *Acanthina* spp. size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Acanthina* (continued).

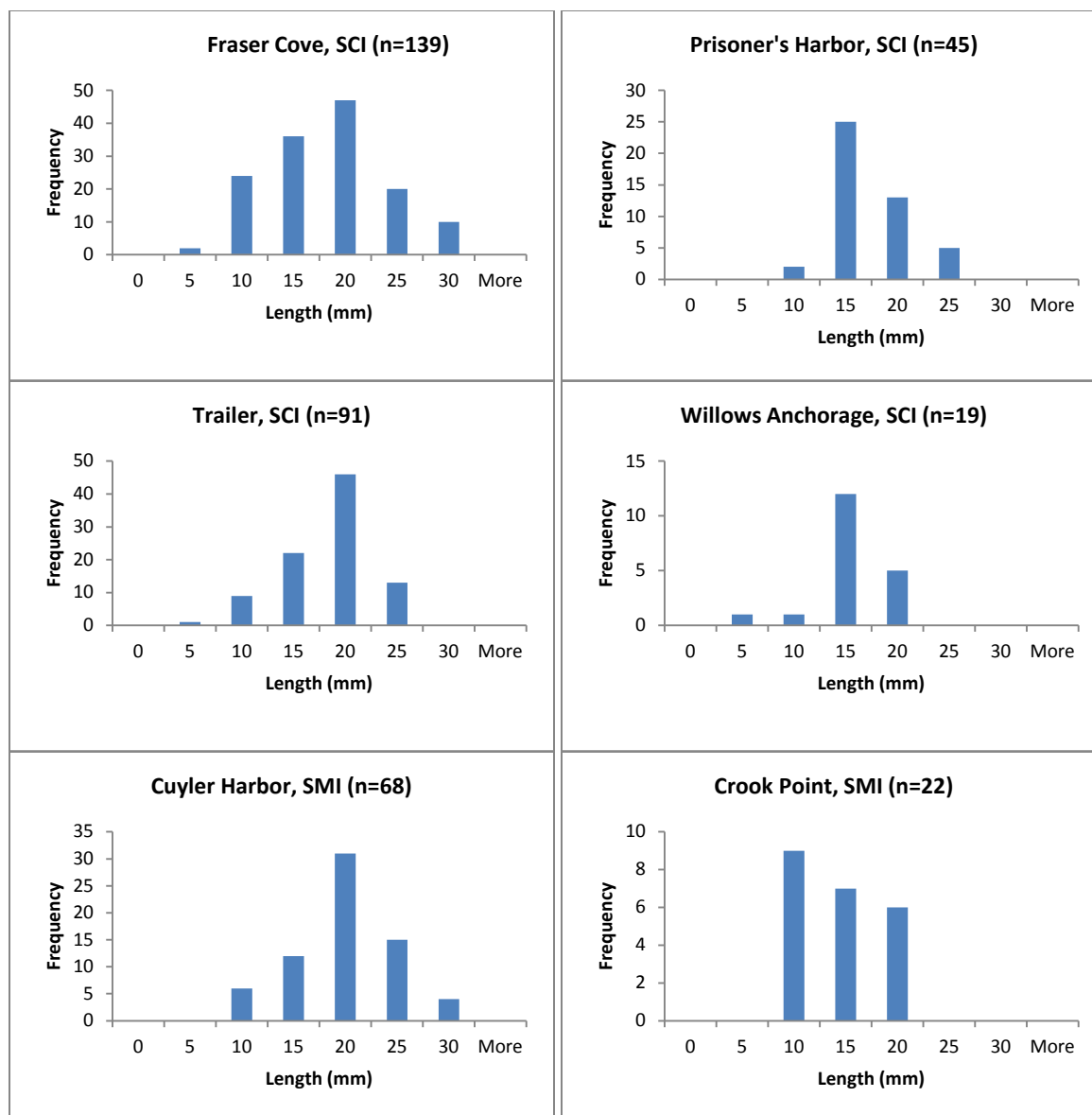
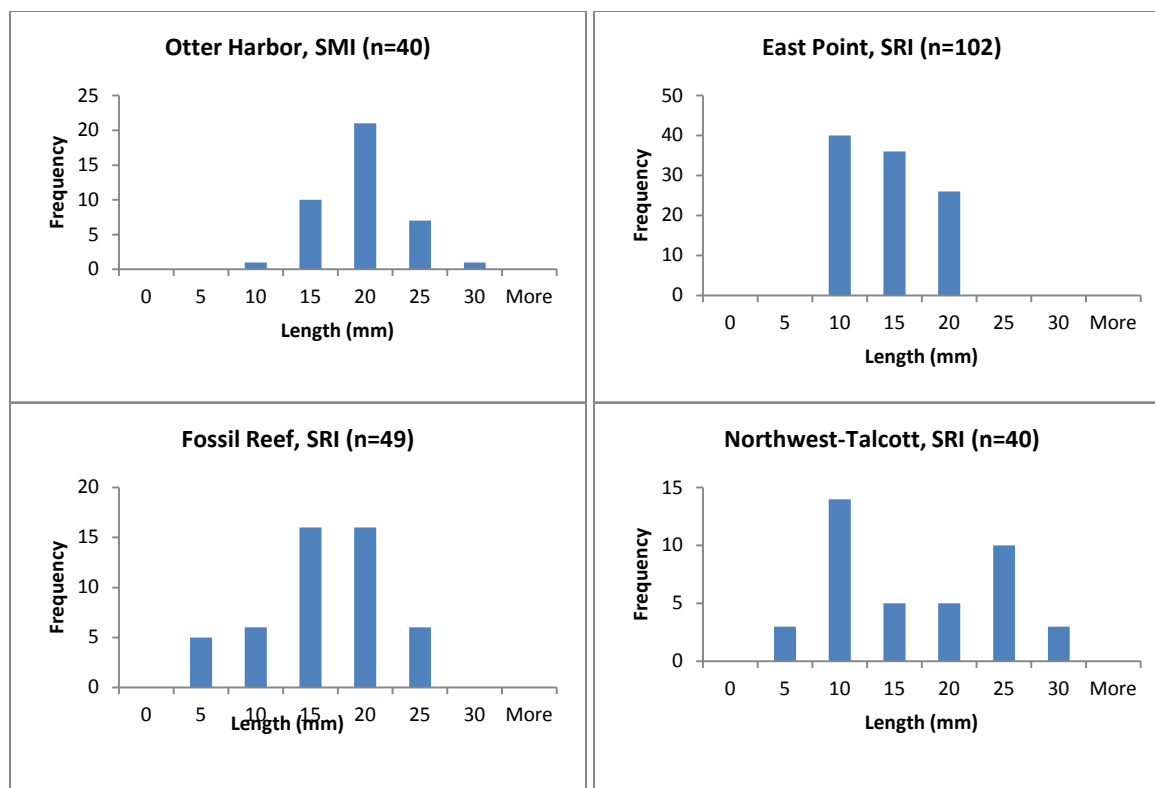


Figure 13. *Tegula funebralis*. Size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Tegula*.



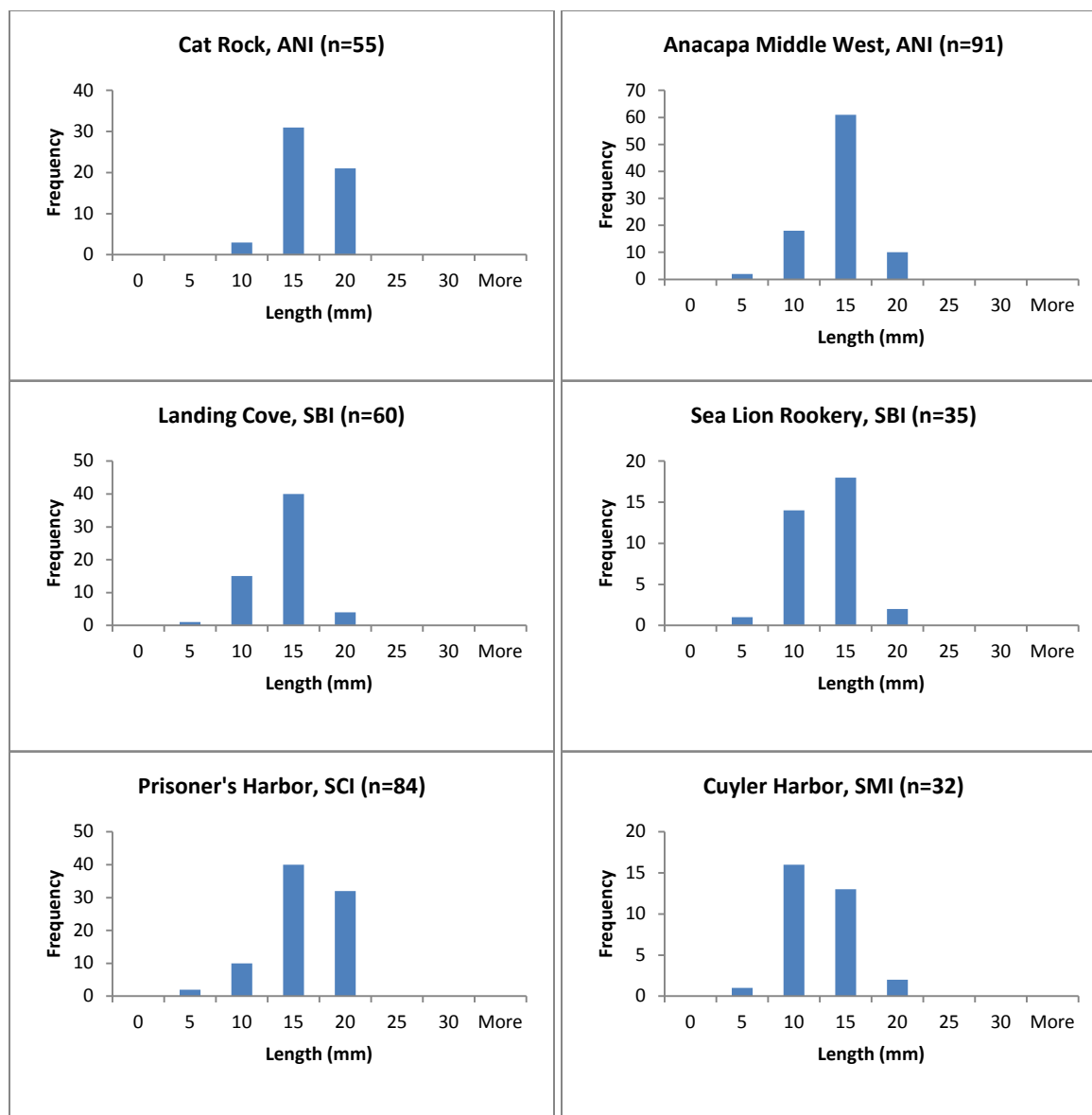


Figure 14. *Ocenebra circumtexta* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Ocenebra*.

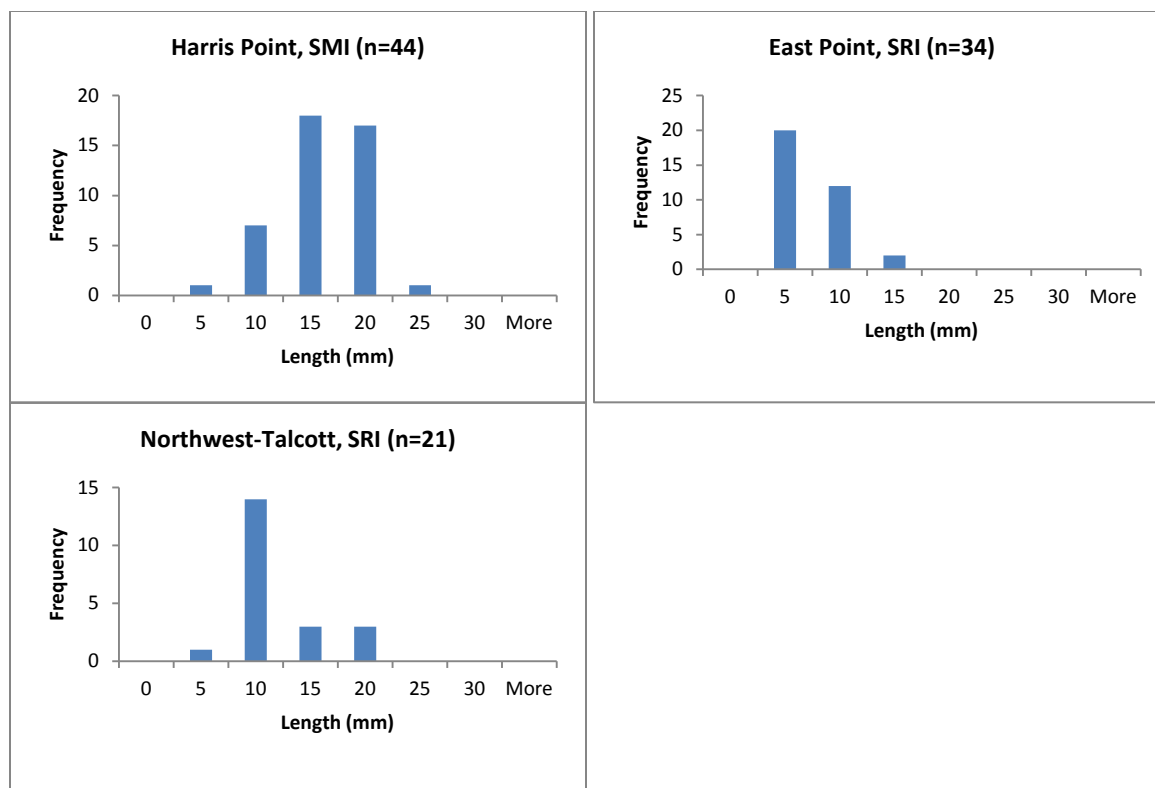


Figure 14. *Ocenebra circumtexta* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Ocenebra* (continued).

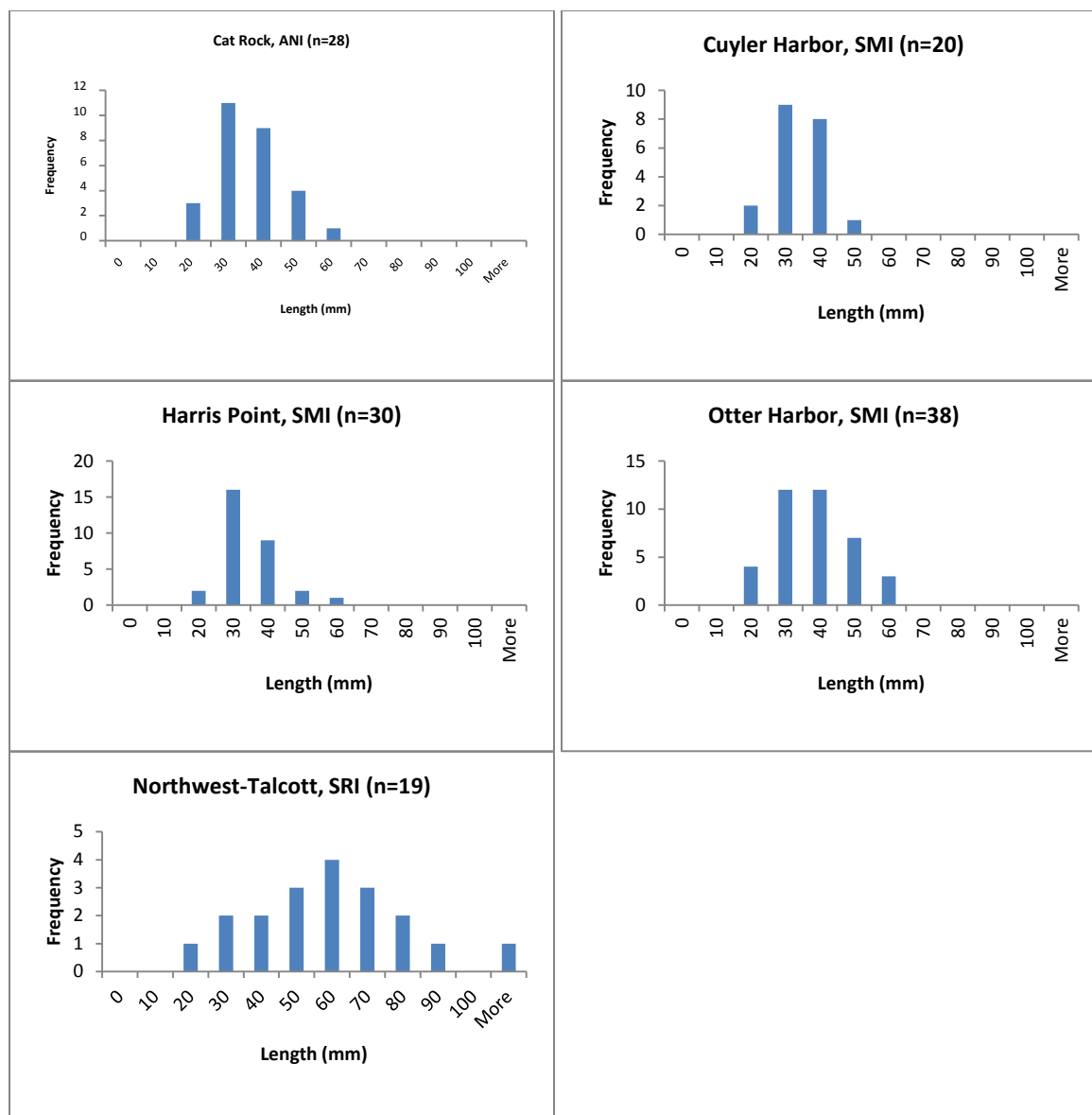


Figure 15. *Lottia gigantea* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Lottia gigantea*.

Haliotis cracherodii

Haliotis cracherodii, once abundant at the islands were nearly wiped out by a bacterial pathogen (Richards and Davis 1993, Friedman et al. 2000). In 2006, the largest remnant population was at Otter Harbor, San Miguel Island. Mass mortalities have not been seen since the 1992 El Niño; however we do still see occasional evidence of the disease. A dead and withered *H. cracherodii* was found at Trailer in 2006, the only apparent disease victim found.

Thirty-minute search counts of *H. cracherodii* were completed at least once at all sites except Scorpion Rock (Tables 2-4). Fixed plot sampling is not practical with the low levels of abalone found at the islands as only two abalone were found in plots in 2006. Timed searches are somewhat variable due to environmental conditions and ability of the person searching, but do provide a relative scale to understand the abalone population.

Otter Harbor once again had the largest population of *H. cracherodii*, with 63 measured in a 30-minute search (Table 4). More abalone were present on the reef adjacent to the site; we measured 94 additional individuals for size frequency. Crook Point, Trailer, and Willows Anchorage had moderate numbers of abalone (moderate by current standards- these sites would have had hundreds of abalone in 1985). Willows Anchorage had the most (26) we have ever counted at the site; only nine were counted in 2005. We found two *H. cracherodii* at Landing Cove, Santa Barbara Island, but did not find any abalone in the 30-minute search at the other site on Santa Barbara, Sea Lion Rookery. However, one individual was discovered on a biodiversity transect at Sea Lion Rookery. All three Santa Barbara Island abalone were close to 60 mm in length. In 2005, we were unable to find any abalone at the island. At Anacapa Island, three abalone were found at Cat Rock occupying the same crevices we typically find them in. Five small abalone were found at Middle West but none were found near the abalone monitoring plots at Harbor Seal Arch.

Four *H. cracherodii* were found at Johnson's Lee and all escaped sand burial. We found 23 *H. cracherodii* on the reef west of Fossil Reef but only nine within the monitoring area. The number of abalone located at the site increased from last year, but the 23 individuals found on the adjacent reef fell from 45 in 2005. No abalone were found at Sea Lion Rookery, South Frenchy's Cove, Fraser Cove, Prisoner's Harbor, or Northwest-Talcott.

A size histogram of *H. cracherodii* from all the islands combined is heavily weighted towards larger animals (Figure 16). No abalone less than 45 mm (probably at least 4 years old) were found.

Table 3. *Haliotis cracherodii* counts from 2006 sampling. Data from sites are combined by island. CountRandom is the number of abalone from 30-minute search, CountInPlot is the number of abalone found in fixed plots (not all sites were monitored each season, thus area size is different).

Island Code	Season	Count Random	Count In plot	Count Sized	MeanSize (mm)	StDev	MinSize (mm)	MaxSize (mm)
AN	1	1	0	1	115		115	115
AN	3	8	0	8	94	30	55	134
SB	3	3	0	3	61	3	58	65
SC	3	54	0	36	86	29	45	147
SM	3	94	2	33	112	24	47	151
SR	3	26	0	26	127	23	84	168

Table 4. Sea star and black abalone searches in spring 2006. (x indicates no plot or transect, nc indicate no count performed, P.o.= *Pisaster ochraceus*, P.g.=*P. giganteus*, P.b.= *P. brevispinous*, P.h.=*Pycnopodia helianthoides*, P.m.= *Patiria miniata*).

Site	Sampling Date	Seastars in 30 min	Seastars in transects	Abalone in plots	Abalone search
Cuyler Harbor, SMI	ns				
Crook Point, SMI	ns				
Otter Harbor, SMI	ns				
Harris Point, SMI	ns				
Fossil Reef, SRI	ns				
Johnson's Lee, SRI	ns				
Ford Point, SRI	ns				
Northwest-Talcott, SRI	ns				
East Point, SRI	ns				
Fraser Cove, SCI	ns				
Trailer, SCI	ns				
Willows Anchorage, SCI	ns				
Scorpion Rock, SCI	3/25/06	80 P.o.	x	x	nc
Prisoner's Harbor, SCI	ns				
Orizaba Cove, SCI	3/27/06	105 P.o.	x	x	2
Cat Rock, ANI	ns				
South Frenchy's Cove, ANI	3/28/06	3 P.o.	x		
Middle Anacapa-West	3/26/06	122 P.o.	x	0	1

Table 5. Sea star and black abalone searches in fall 2006. (x indicates no plot or transect, nc indicate no count performed, P.o.= *Pisaster ochraceus*, P.g.=*P. giganteus*, P.b.= *Pisaster brevispinus*, P.h.=*Pycnopodia helianthoides*, P.m.= *Patiria miniata*.)

Site	Sampling Date	Seastars in 30 min	Seastars in transects	Abalone in plots	Abalone search
Cuyler Harbor, SMI	1/16/07	149 P.o.	x	x	0
Crook Point, SMI	1/19/07	100 P.o.	x	0	22
Otter Harbor, SMI	1/17/07	76 P.o., 7 P.g. 1 P.m.	x	1	63
Harris Point, SMI	1/18/07	10 P.o. 1 P.g., 5 P.m.	1	1	9
Fossil Reef, SRI	12/1/06	nc	90 (30x6)	0	9
Johnson's Lee, SRI	12/4/06	91 P.o. area 1 36 P.o. area 2 54 P.o. area 3	13 (10x2)	0	4
Ford Point, SRI	12/1/06	370 P.o., 1 P.g.	x	0	2
Northwest-Talcott, SRI	12/2/06	2 P.o., 1 P.g.	x	0	0
East Point, SRI	12/3/06	51 P.o.	x	0	1
Fraser Cove, SCI	12/18/06	67 P.o., 1 P.g.	x	x	0
Trailer, SCI	12/19/06	127 P.o., 3 P.g.	x	x	29
Willows Anchorage, SCI	12/20/06	187 P.o.			26
Scorpion Rock, SCI	ns				
Prisoner's Harbor, SCI	1/31/06	14 P.o.	x	x	0
Orizaba Cove, SCI	1/3/07	303 P.o.	x	x	nc
Cat Rock, ANI	11/20/06	0	x	0	3
South Frenchy's Cove, ANI	11/22/06	16 P.o.	x	x	0
Middle Anacapa-West	11/21/06	93 P.o.	x	0	5
Sea Lion Rookery, SBI	11/4/06	61 P.o.	x	0	0
Landing Cove, SBI	11/6/06	33 P.o.	10 (18x2)	x	2

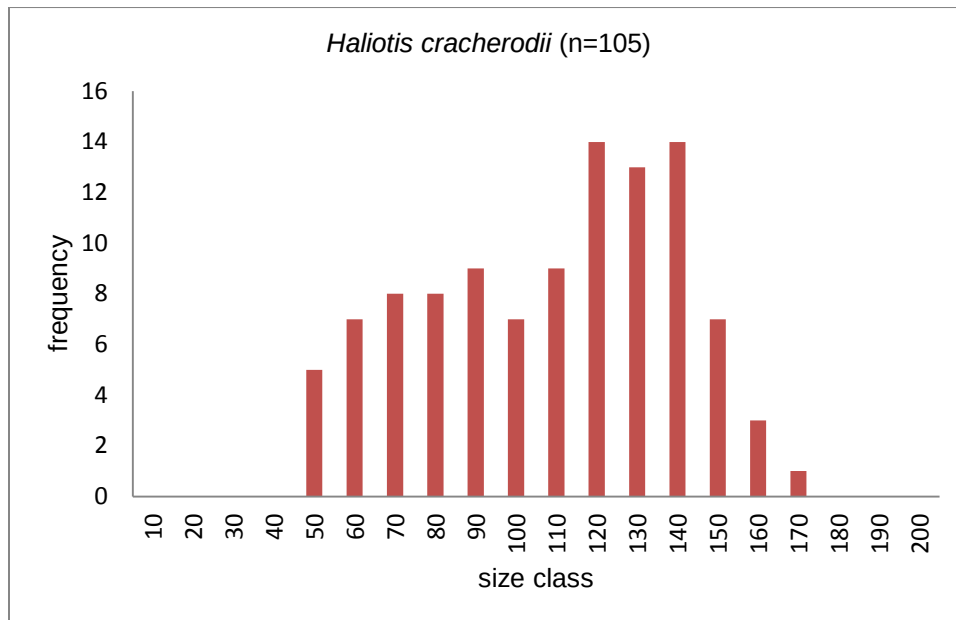


Figure 16. *Haliotis cracherodii* size distribution in fall 2006, all sites combined.

Pisaster ochraceus

Seastar counts are presented in Tables 3 and 4. *Pisaster ochraceus* were by far the most common seastar encountered at our rocky intertidal sites, but we also found *P. giganteus* at many sites and *Patiria miniata* at a few sites. Ford Point, Orizaba Cove, Johnson's Lee, Willows Anchorage, Trailer, Fossil Reef, Cuyler Harbor, and Crook Point all had relatively large populations (100 or more in the 30 minute count) of *P. ochraceus*. Middle Anacapa West had a high count in the spring and slightly less in fall. The count at Scorpion Rock was actually fairly high considering that the reef area is only a small fraction of the size of other sites. The seastars were also large at Scorpion Rock with only 10 being less than 100 mm radius. Size frequencies for seastars can be found in the trip reports (Appendix C).

Pisaster ochraceus, ochre seastars, were not very numerous at either Santa Barbara Island site. Fewer than 100 were measured at either site. Colors were noted at Santa Barbara Island where about 13% of the *P. ochraceus* were orange (verses brown or purple) at Sea Lion Rookery and 30% were orange at Landing Cove. Typical for Northwest-Talcott, only three seastars were found at the site. Cat Rock is another site that typically has few or no seastars and none were found in 2006. Though still relatively rare, more *P. ochraceus* than usual were found at South Frenchy's Cove because of an expanded search area. Prisoner's Harbor and Harris Point also had very small populations of all seastars.

The reef at Johnson's Lee was divided into three areas and counts were made in each to attempt to document the distribution of sea stars on the reef (Table 4). The western portion, Area 1, had the most seastars, while Area 2 in the middle of the site had the fewest. Area 2 usually has more stars but the unusually high sand level had buried most of the deep crevice located in that area of the reef. The size distribution of *P. ochraceus* at Johnson's Lee revealed relatively high numbers of both juveniles and large adults.

The smallest mean sizes (approximately 74 mm radius) for *P. ochraceus* were measured at Johnson's Lee and Trailer (Table 5). However, smaller juveniles were observed at all sites except Fossil Reef. The largest individuals (>100 mm) were seen at Fossil Reef, Fraser Cove, Orizaba Cove and Prisoner's Harbor.

Above normal sea temperature anomalies occurred during the last five months in 2006 according to the NOAA Climate Prediction Center. We observed increased incidences of seastar wasting disease during the summer but no disease was reported during the fall monitoring. *P. ochraceus* numbers actually increased at two of the three sites we had both spring and fall data in 2006. Compared to fall 2004, counts were down by half or more at both Santa Barbara Island sites, Willows Anchorage and Johnson's Lee. As mentioned above, Johnson's Lee was heavily impacted by sand at the time of the fall sample. Seastar counts increased at Crook Point, Otter Harbor and Prisoner Harbor. Direct comparisons between counts at different sites and at different times should be made with caution because the timed counts are subject to environmental factors and to the abilities and effort of the person conducting the count for instance a swell will prevent spending as much time in the lower reaches of the tidal zone and heavy algal growth may obscure juvenile seastars deep in crevices.

Table 6. *Pisaster ochraceus* size mean and range (count = number measured).

	<i>SREP</i>	<i>SRFR</i>	<i>SRFP</i>	<i>SRJL</i>	<i>SCOC</i>	<i>SCFC</i>	<i>SCPH</i>	<i>SCTR</i>	<i>SRWA</i>	<i>ANMW</i>	<i>SBLC</i>	<i>SRSLR</i>
count	51	105	96	115	100	67	14	108	127	93	39	61
min	30	75	14	16	25	35	40	20	20	24	20	40
max	155	160	130	135	175	170	180	130	140	175	170	155
mean	92.35	115.67	85.47	74.49	103.60	111.55	106.43	74.91	88.82	88.69	93.97	99.26
stdv	32.78	16.25	25.85	19.93	46.02	36.18	57.59	20.85	27.39	41.78	38.08	26.94

Lottia gigantea

Lottia gigantea are large protandrous limpets that graze on algal film on the rocks (Stimson 1970, Wright and Lindberg 1982) (Figure 8). Not all sites have adequate numbers for monitoring so we only have fixed plots at 11 sites. We measured 190 *Lottia gigantea* in a 40-timed search at Sea Lion Rookery for size frequency analysis. *Lottia gigantea* are common on the boulders on the reef flat there, but they are fairly dispersed, thus the density is low and we never established fixed plots. We usually only monitor *L. gigantea* in the fall, however we did monitor them at South Frenchy's Cove in spring 2006, as well, with comparable numbers found in both seasons. Statistics are presented for data pooled by island (Tables 6 and 7). Size frequencies for individual sites and plots can be found in the trip reports (Appendix C).

Figures 9-12 show the trends for density and mean sizes at each site. Trailer was the only site where we saw a slight upturn in density in 2006, following a two year decline. The size distribution at Trailer; though, shows few small limpets. South Frenchy's Cove and all the Santa Rosa Island sites had a small decline in density in fall 2006.

The largest individual *L. gigantea* were at Northwest-Talcott where we found six in plots that were over 100 mm and the largest was 112 mm. Northwest-Talcott has a large flat reef composed of Monterey Shale that seems to be ideal for these large limpets.

As mentioned before, sand inundated the Johnson's Lee site burying parts of the reef. *Lottia* plot 1 was completely buried with the sand at least one meter deep, and the lower half of *Lottia* plot 3 (which is on a 45° slope) was under sand. Near plot one several large owl limpets were aggregated together on a high rock like shipwreck survivors. One has to question if sand burial is to blame for the decline of *L. gigantea* at this site. An influx like this could easily occur without detection between visits. Though probably very ephemeral, possibly lasting just days (based on not having seen it happen before); we can only guess that *L. gigantea* may not be able to tolerate burial and so either perished or moved up or down coast.



Figure 17. Large female *Lottia gigantea* with smaller male on shell.

Table 7. *Lottia gigantea* plot count and size information. All sites pooled by island.

Island Code	Year	Season	Count Random	Count Density	Area (m ²)	Density	Count Sized	Mean Size	StDev	Min Size	Max Size
AN	2006	1	0	20	9.42	2.12	20	45.60	11.00	20	61
AN	2006	3	116	109	18.85	5.78	225	33.00	10.47	12	66
SB	2006	3	190	0		.00	190	34.16	9.85	15	60
SC	2006	3	0	139	51.83	2.68	139	49.64	19.63	16	92
SM	2006	3	0	362	31.41	11.52	362	37.14	12.98	12	75
SR	2006	3	0	392	56.54	6.93	392	52.15	22.02	12	112

Table 8. Size distribution of *Lottia gigantea* in 2006. All sites pooled by island.

Island	Season	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm	%80-89mm	%90-99mm	%≥100mm
AN	spring	0.00%	10.00%	5.00%	50.00%	20.00%	15.00%	0.00%	0.00%	0.00%	0.00%
AN	fall	8.00%	34.22%	31.11%	18.67%	6.67%	1.33%	0.00%	0.00%	0.00%	0.00%
SB	fall	7.89%	23.68%	42.11%	16.84%	8.42%	1.05%	0.00%	0.00%	0.00%	0.00%
SC	fall	3.60%	12.95%	20.14%	16.55%	17.27%	10.79%	8.63%	7.19%	2.88%	0.00%
SM	fall	4.42%	27.35%	32.04%	19.89%	8.29%	6.08%	1.93%	0.00%	0.00%	0.00%
SR	fall	10.71%	8.67%	10.46%	14.54%	18.11%	14.54%	11.22%	7.65%	2.81%	1.28%

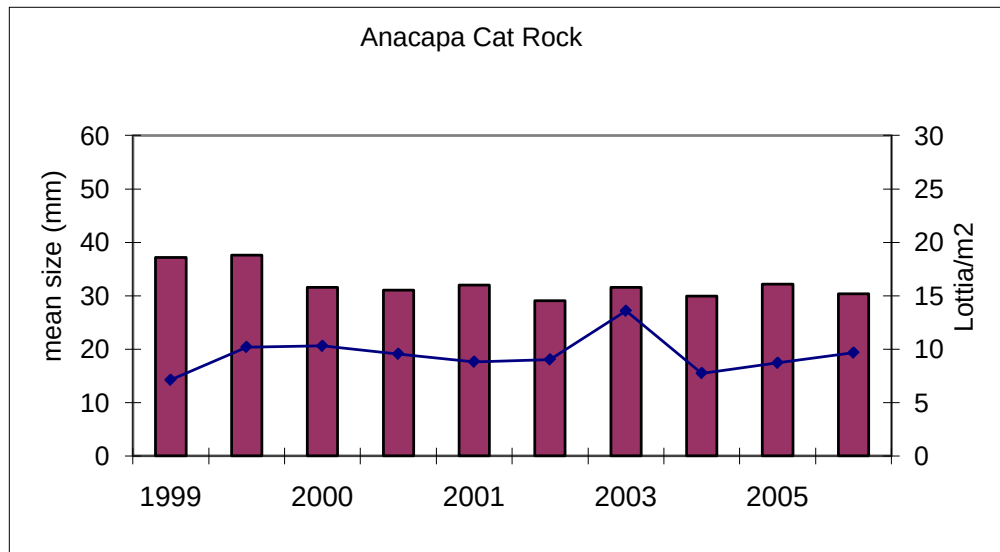
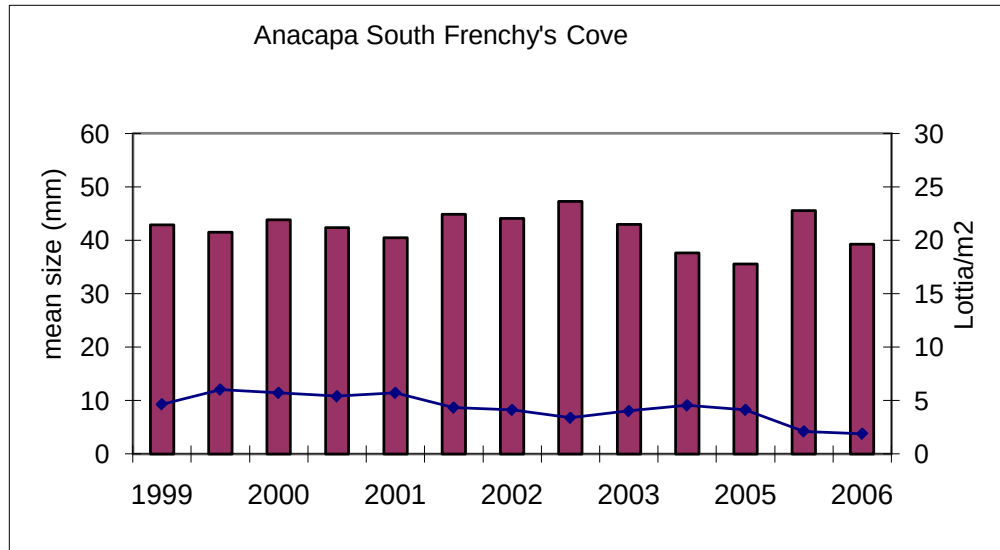


Figure 18. *Lottia gigantea* at Anacapa Island 1999-2006. Bars represent mean density and lines represent mean size (mm) from three fixed plots.

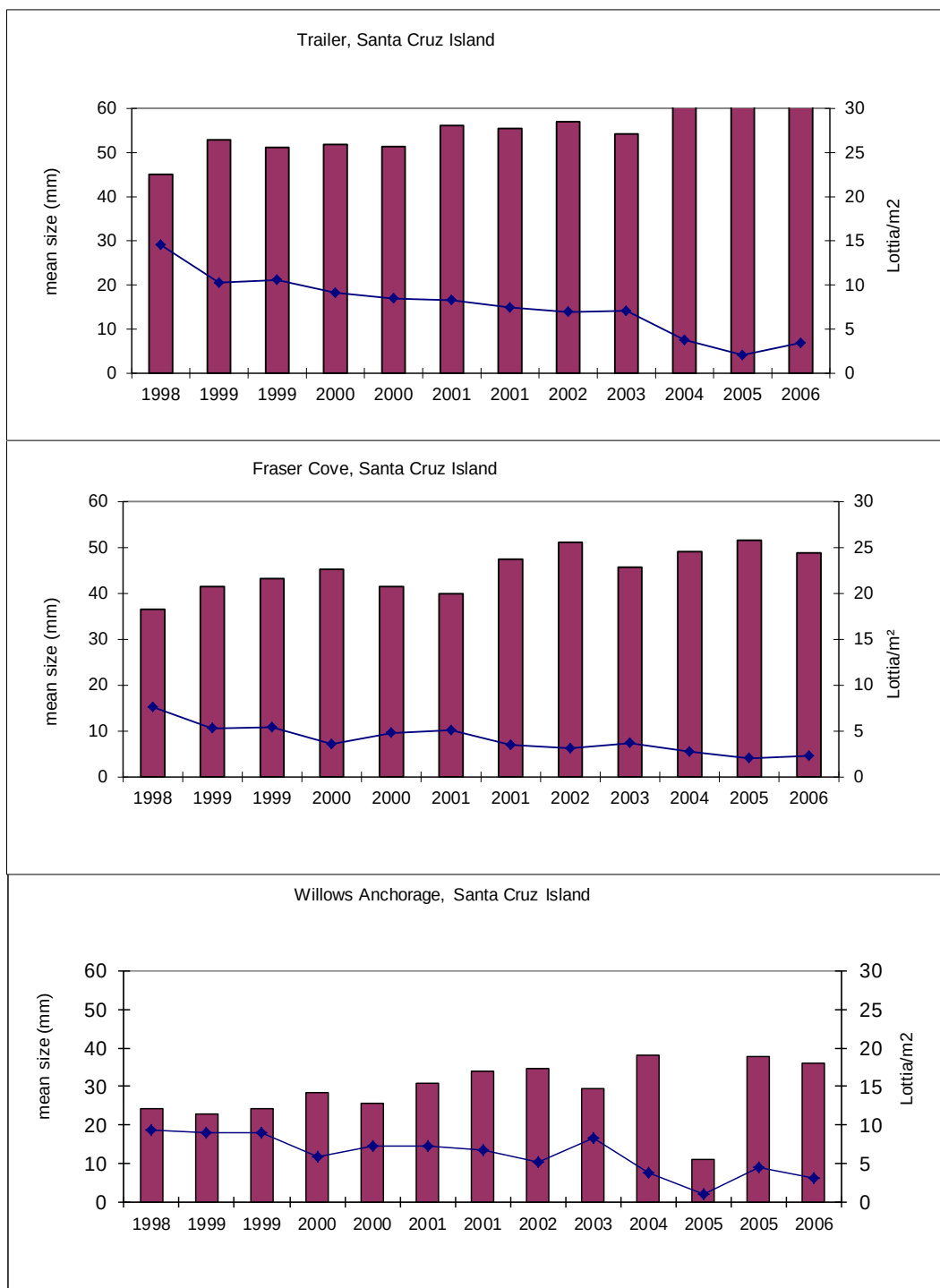


Figure 19. *Lottia gigantea* at Santa Cruz Island 1998-2006. Bars represent mean density and lines represent mean size (mm) from five fixed plots.



Figure 20. *Lottia gigantea* at Santa Rosa Island 1998-2006. Bars represent mean density and lines represent mean size (mm) from five fixed plots.

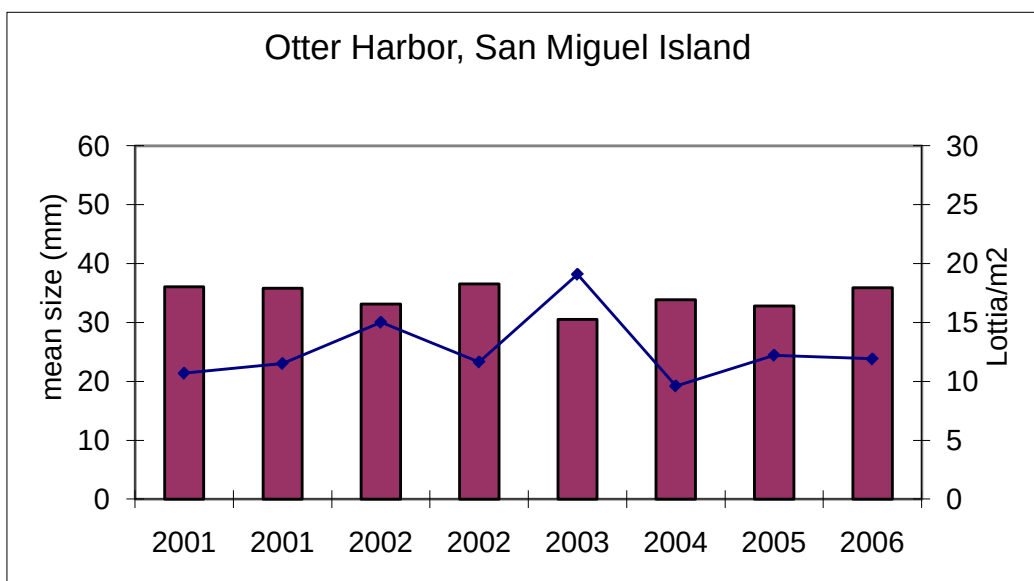
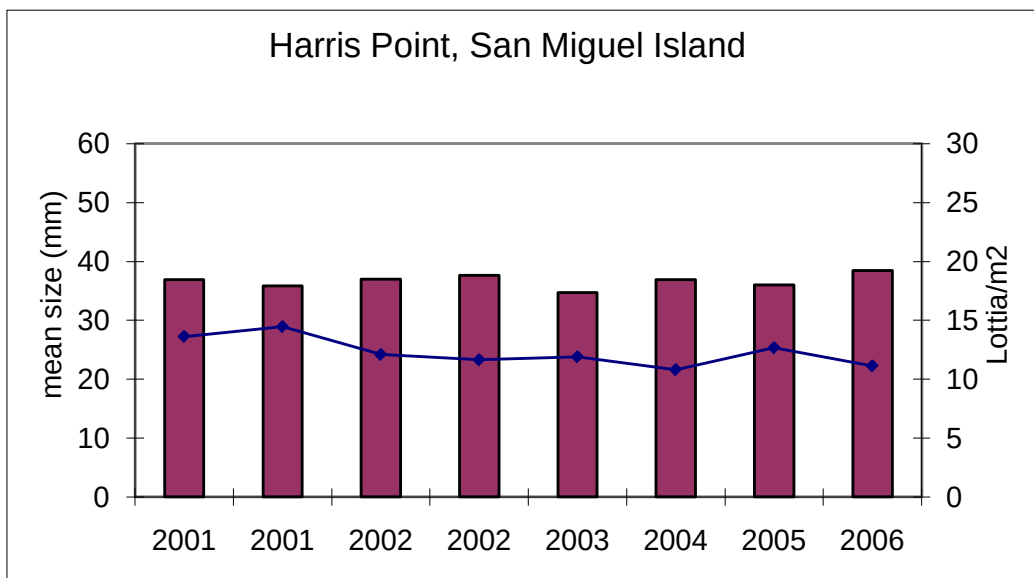


Figure 21. *Lottia gigantea* at San Miguel Island 2001-2006. Bars represent mean density and lines represent mean size (mm) from five fixed plots.

***Phyllospadix* spp.**

Phyllospadix spp., surfgrass (Figure 13), cover was monitored at two sites each on Santa Cruz Island and Santa Rosa Island. *Phyllospadix torreyi* was the dominant species present in most transects but some *P. scouleri* may have been present. Figures 14 and 15 show the trends for each of the three transects at the four sites. Tables with complete results from 2006 are in the trip reports (Appendix C).

Overall the surfgrass overstory cover remained relatively high in all transects with little change over the years. Transect 2 at Trailer was back over 80% surfgrass cover after a number of years with slightly depressed cover (Figure 14). *Phyllospadix* cover increased in 2006 in two of the transects and overall, the Santa Cruz sites had slightly higher cover than in 1998. Surfgrass cover in the East point transects ranged from 88-98%. There was a small increase in transect 3, which normally has the lowest cover and while the other two transects decreased slightly. Very little bleaching was noted which was surprising because of the low tides and warm weather in preceding days (Figure 14). Transect 3 at Northwest Talcott continued its gradual increase in surfgrass cover reaching 91% surfgrass cover for the first time (Figure 15).



Figure 22. *Phyllospadix* transect 1 at East Point, Santa Rosa Island.

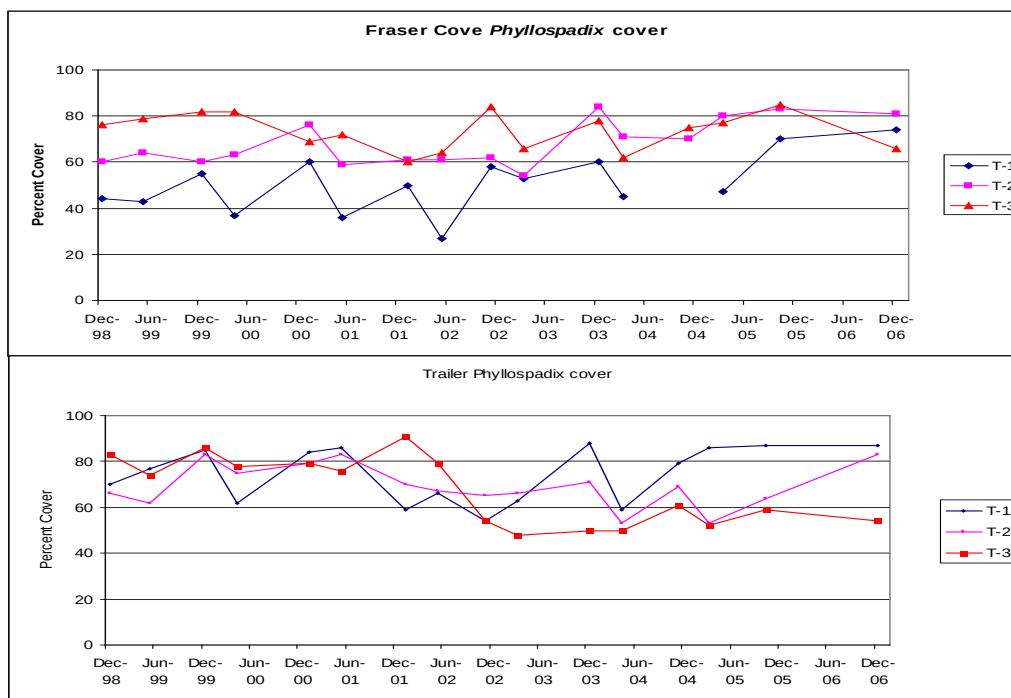


Figure 23. *Phyllospadix* spp. cover trends on 10m point-intercept transects at Trailer and Fraser Cove, Santa Cruz Island.

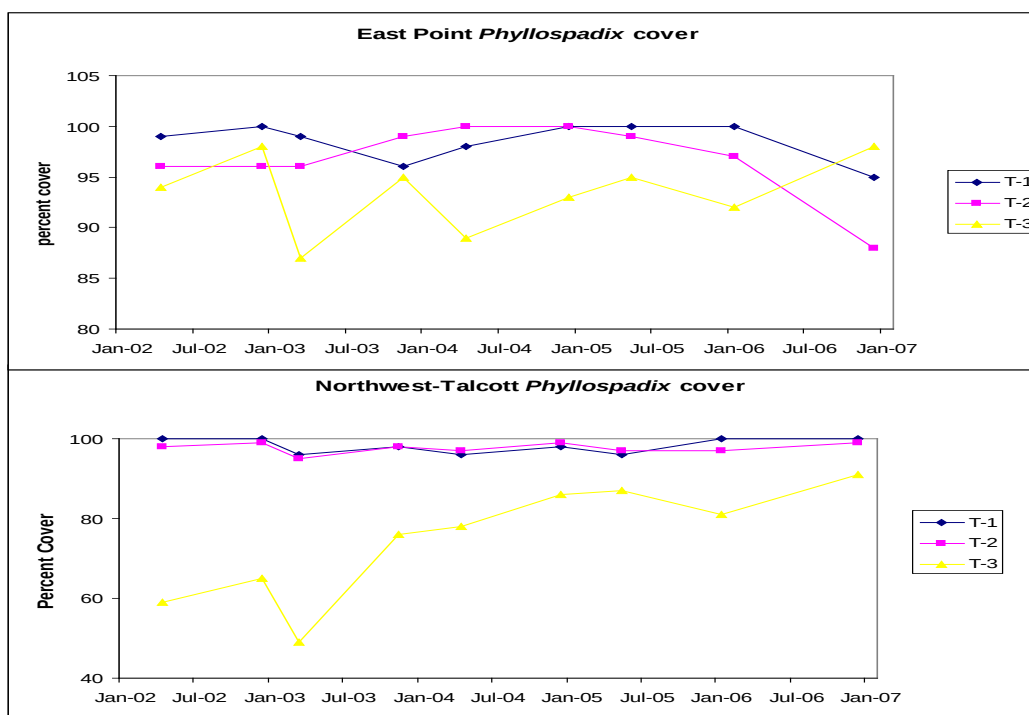


Figure 24. *Phyllospadix* spp., cover trends on 10m point-intercept transects at Northwest-Talcott and East Point Santa Rosa Island.

Shorebirds and Pinnipeds

Tables 7 and 8 present a summary of the shorebird and pinnipeds observed at the sites in 2006. In 2006, we had a total of six sightings of American oystercatchers, *Haematopus palliatus*, from five different sites on the four northern islands. Black oystercatchers, *H. bachmani*, were again the most ubiquitous shorebird, seen at all sites at least once during sampling in 2006 except at Ford Point and Johnson's Lee. The largest aggregation of black oystercatchers was seen at Orizaba Cove where 20 were seen on Orizaba Rock. Groups of 10 black oystercatchers were seen at East Point and Fossil Reef. One of the American oystercatchers seen was also at Fossil Reef where we often see a large group. Black turnstones, wandering tattler, and western sandpiper were the only other shorebirds seen. Only small groups of black turnstones were seen and at only five sites.

Seabirds such as pelicans and cormorants frequently use rocky points and islets as roosting areas. Western gulls, *Larus occidentalis*, roost on the rocky shores and often forage among the mussel beds and adjacent beaches. Terrestrial birds such as song sparrow, *Melospiza meodia*, and black phoebe, *Sayornis nigricans*, often feed on kelp flies in the intertidal zone. Common ravens, *Corvus corax*, frequent the shorelines searching for carcasses and occasionally pick invertebrates from the mussel beds. Two belted kingfishers, *Ceryle alcyon*, were seen at Middle Anacapa Island feeding in the nearshore. At East Point, a peregrine falcon flew off holding prey as we approached, yet there were still 50 cormorants on the reef and 10 black oystercatchers were seen in the vicinity.

Harbor seals, *Phoca vitulina*, were observed at or near seven of the sites. Harbor seals typically haul out on rocky benches at low tide and are seen more frequently in the spring when they have pups. We record harbor seals in the area even if it is not on the monitoring site. Harbor seals are curious and may swim by just to look at us. Our counts of seals nearby the site area are typically swimming nearshore. Harbor seals were most numerous in the spring sample at Cat Rock where 43 were on the gravel beaches on either side of the monitoring site by the time we arrived. Not wanting to disturb them, especially when pups might be present, we did not go ashore. The beaches there have been especially popular with the harbor seals in the spring.

Northern elephant seals, *Mirounga angustirostris*, usually prefer sandy beaches to rocky shelves to haul out, and so are mostly seen adjacent to the monitoring sites. They are a common sight at Crook Point and Fossil Reef in the spring when we find weaned pups that haven't gone to sea yet or adults coming ashore to molt. In December and January, elephant seals aggregate at the islands and mostly concentrate in breeding colonies away from the monitoring reefs.

California sea lions, *Zalophus californianus*, are common at both Santa Barbara Island sites where they can be very numerous. Especially at Sea Lion Rookery, they are responsible for trampling the upper reef and contributing much nitrogen to the system, causing the blooms of *Ulva* sp. Recently weaned yearlings are the majority at Landing Cove where they play and lounge on the rocks

Table 9. Shorebirds and pinnipeds at monitoring sites in spring 2006 (maximum seen at any one time) (*= nearby but not on reef).

<i>Spring 2006</i>						
<u>Site</u>	<u>Black Oystercatcher/ (American)</u>	<u>Black Turnstone</u>	<u>Other birds</u>	<u><i>Phoca vitulina</i></u>	<u><i>Mirounga Angustirostris</i></u>	<u><i>Zalophus californianus</i></u>
ANCR	ns			43		
ANMiddle (all)	5		4 western gull, 20 brown pelican	2		
ANSFC	5(1*)					
SCFC)	ns					
SCTR	ns					
SCWA	ns					
SCSR	5 (2)		4 gull			
SCOC	7		2 common raven, 1 black phoebe			
SREP	ns					
SRFP	ns					
SRFR	ns					
SRJL	ns					
NWT	ns					
SMCH	ns					
SMCP	ns					
SMHP	ns					
SMOH	ns					

Table 10. Shorebirds and pinnipeds at monitoring sites in fall 2006 (maximum seen at any one time) (*= nearby but not on reef).

<i>Fall 2006</i>						
<u>Site</u>	<u>Black Oystercatcher/ (American)</u>	<u>Black Turnstone</u>	<u>other birds</u>	<u><i>Phoca vitulina</i></u>	<u><i>Mirounga Angustirostris</i></u>	<u><i>Zalophus californianus</i></u>
SBLC	5	3	1 Wandering tattler			50
SBSLR	3	5	30 western gulls			200
ANCR	5		1 rock wren			
Middle – all	3		2 belted kingfisher	1*		
ANSFC	3		1 black phoebe			
SCFC	4					
SCTR	1		3 gull, 1 cormorant, 1 common raven	1*		
SCWA	4		1 black phoebe, 100 gulls			
SCSR						
SCPH	1		1 western gull, 1 western sandpiper, 1 black phoebe	1*		
SCOC	20*	1		3		
SREP	10		50 cormorant 9 brown pelican 1 peregrine falcon			
SRFP			2 western gull, 2 song sparrow			
SRFR	10 (1)	2	25 western gull, 20 Brandt's cormorant, 2 song sparrow		2	
SRJL						
SRNWT	6		40 western gull, 1 black phoebe, 2 song sparrow			
SMCH	2				2	
SMCP	6 (1)	3	3 western gull 3 Brandt's cormorant	1*	4	
SMHP	7			4	1	1
SMOH	8 (1)		3 western gull	8	1	2

Visitation

Visitation to Frenchy's Cove on Anacapa Island is reported here since trips there are usually specifically to visit tidepools. Most visitor experiences with the rocky intertidal occur at Frenchy's Cove, though some Santa Rosa Island visitors see East Point tidepools with a park naturalist. Island Packers Company generally conducts classroom programs, combining oceanography with the tidepool experience for area school groups in the winter and spring months.

Visitation numbers for Frenchy's Cove are available from monthly reports based on concessionaire reporting from Island Packers Company and Truth Aquatics (Table 10, fig.16). No records are available for the number of private boaters going ashore there, but the number is probably very low. Visitation figures for East Point, Santa Rosa Island are not available, but visitation there is very low also. Prisoner's Harbor is near the pier and gets some visitation, however, access to the reef is difficult, requiring some climbing or scrambling on an obscure trail.

The total visitation from concession boats in 2006 was only 1326 passengers (Table 10) which was the lowest visitation since 1992 (Figure 17). March was once again the top month for visitation with 646 passengers on 13 trips. In 2006, 89 percent of the visitation occurred in the spring (February-April). It was an unusual year with so many months with no visitation, especially in the fall months. Most of the low tide events between May through August were early in the morning and then starting in September they were late in the afternoon. Both situations make it difficult to schedule transportation for visitors, which may be why visitation was so low.

Table 11. Visitors to South Frenchy's Cove, Anacapa Island in 2006 (visitation with Island Packers).

YEAR	MONTH	#Passengers	#TRIPS	Pass/trip
2006	January	46	1	46
2006	February	234	4	59
2006	March	506	6	84
2006	April	446	6	74
2006	May	0	0	0
2006	June	0	0	0
2006	July	41	1	41
2006	August	0	0	0
2006	September	0	0	0
2006	October	0	0	0
2006	November	53	2	27
2006	December	0	0	0
2006	total	1326	20	

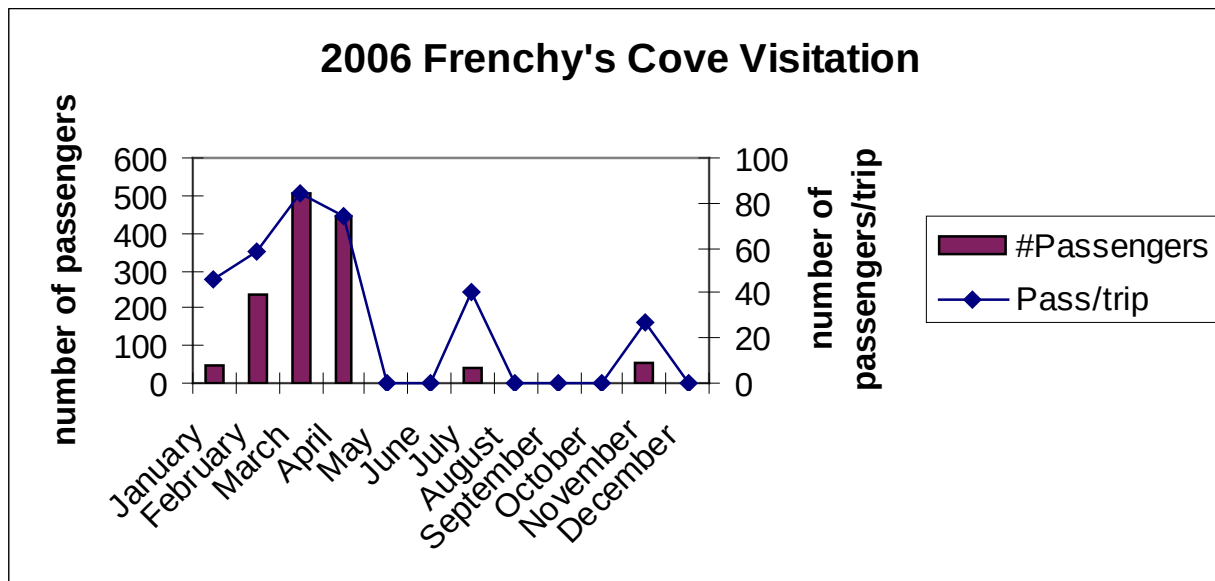


Figure 25. 2006 monthly visitation at Frenchy's Cove, Anacapa (Island Packers visitors).

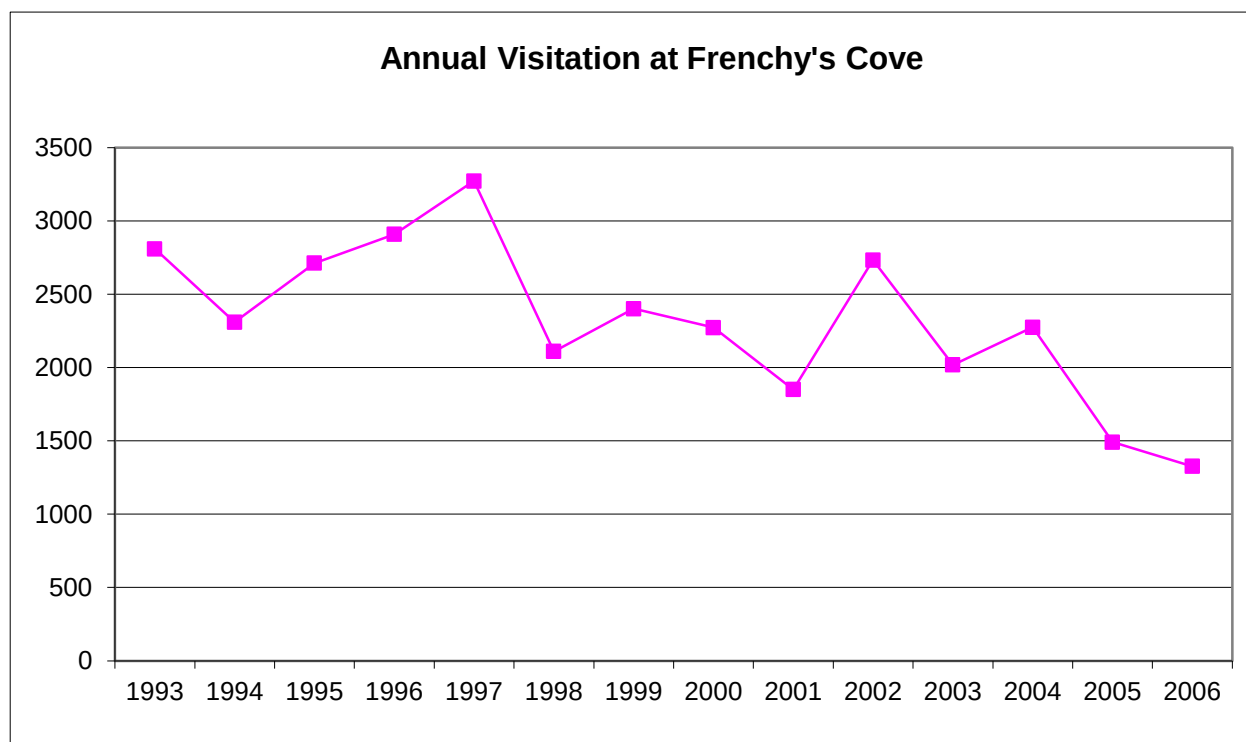


Figure 26. Annual Visitor totals (Island Packers Company) at Frenchy's Cove, Anacapa Island 1993-2006.

Trip Reports

Summaries of work performed, data collected, weather conditions, and natural history observations for each sampling event are presented in the individual trip reports in Appendix C. Explanations for missing or incomplete data are usually found there. Summary tables and figures in the trip reports present additional information on species monitored. For simplicity, photoplot data tables use the combinations of species in lumped categories used in previous reporting (non-core species are combined in Misc. plants or animals). Complete results of seastar, surfgrass and motile invertebrate sampling are presented in the daily trip reports.

Since rocky intertidal monitoring trips were often combined with beach or shorebird monitoring for efficiency, trip reports contain information on beach surveys. Observations on species not directly monitored are reported in the trip reports. For example, at Northwest-Talcott we found a pair of blind gobies, *Typhlogobius californiensis*, that live commensally with tidepool ghost shrimp, *Neotrypaea biffari* (Figure 18).



Figure 27. Ghost shrimp and blind gobies found at Northwest-Talcott.

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Appendix A: Program Notes

Dan Richards and Susie Tharratt led the 2006 sampling effort. Anna Braswell was hired as a Student Conservation Association intern continuing the process of cataloging and scanning data slides as well as being a great field assistant. She also began the process of helping us solidify and standardize the photopoint methodology for the monitoring.

We sampled 22 sites at least once in 2006. The spring sampling was reduced for a number of reasons including; restricted access due to nesting of endangered California Brown pelicans (on Santa Barbara Island), harbor seals with pups present (Cat Rock), weather and other logistical constraints, or for administrative reasons. In the fall of 2006, we made visits to all five islands, including 20 of the 21 monitoring sites. Our efforts during the spring sampling went into catching up on data scoring and revising the system for transferring our data to MARINe. Bonnie Becker from Cabrillo NM assisted us greatly in fixing the macros necessary to convert the Access data between databases.

Biodiversity transects were sampled at the two Santa Barbara Island sites in 2006 (Coastal Biodiversity Survey website). Haven Livingston, Rani Gaddam, and Kyle Walters from U. C. Santa Cruz (and PISCO) replaced transect bolts that were not stainless steel and were rusting badly, and conducted the transect counts.

At Santa Barbara Island, we collected tissue samples from six dead sea lion pups for genetic analysis as part of a project by the Marine Mammal Center. This was a continuation of a project begun in 2005.

During survey trips to Santa Rosa and San Miguel Islands, we combined the rocky intertidal monitoring trips with beach monitoring by conducting beachwalk surveys on. In the beachwalk surveys, main beaches were walked to count shorebirds and carcasses. Relative amounts of tar and debris were noted as well. These surveys provide baseline information that may be used as background data in the event of an oil spill for example.

We were able to utilize the *RV Shearwater* for 8 days granted to us by Channel Islands National Marine Sanctuary. We also use the NPS vessel *Sea Ranger II* for one day. Other sites were accessed from land and we stayed on shore at NPS housing or the UC Natural Reserve System Field station at Santa Cruz Island.

We generally experienced pleasant conditions while sampling but did have rain while sampling at South Frenchy's Cove and there were some days of wind and swell. Swell hindered sampling somewhat at Santa Barbara Island, and as a result, some motile plots were not counted. We had some difficulty locating corner bolts in several mussel zone plots at both sites due to dense growth of mussels.

Heavy rain and large seas prevented much of the spring sampling. Unseasonably warm water was recorded in southern California during late July of 2006. This was an unusual phenomenon not related to El Niño and thought to be the result of unusually calm conditions cause the cessation of upwelling for at least two weeks. By August, temperatures had returned to near normal. On August 3, 2006, news stations reported 300 purple sea urchins washing ashore in the Long Beach area, thought to be a result of high sea surface temperatures. No such mass die-off was observed at the islands. While diving (during Kelp Forest Monitoring or Channel Islands Research Program monitoring), we did observe numerous *Pisaster* and *Patiria* with wasting disease at the islands during the summer. There were few storms in the fall of 2006 and those were mostly high wind events. The first significant rain of the season occurred in January 2007. Large fires fueled by easterly dry winds (known as Santa Ana winds) were common in southern California in September and October.

Susie assisted the NOAA LiMPETS (Long-term Monitoring Program and Experimental Training for Students) (http://limpetsmonitoring.org/rocky_intertidal.php) at South Frenchy's Cove. The purpose of the program is to conduct monitoring and increase awareness and stewardship of marine resources. Some teachers from that program assisted us one day at Anacapa Island as part of their training program.

We tested fish sampling methodology at Santa Barbara Island by draining a pool using a kayak pump. It took longer than anticipated to drain the tidepool we chose, but the system did work and has potential for being added to our protocol eventually. We found 3 *Gibbonsia* spp. (most about 70 mm), *Oligocottus* sp. (60-92 mm) in one moderate pool at Sea Lion Rookery.

When we could spare time for plot repairs we replaced many of the brass numbered plot identification tags that have become unreadable over time due to corrosion. The replacements were new epoxy corners with numbers written into the soft epoxy. Numbered corners are generally the upper left corner with back to the water. The epoxy numbers work well but need to be large enough to make deep clear numbers in the epoxy.

Appendix B. Photoquadrat Data Tables

Percent cover of selected taxa in fixed 50 x 75 cm photoquadrats based on 100 points per plot. Target taxa are presented in the tables for each site and each sampling (spring and fall). Acorn barnacle taxon includes *Balanus glandula* and *Chthamalus fissus/dalli*. *Pollicipes polymerus* is listed as leaf barnacle. Turf-weed taxon is only used at Landing Cove Santa Barbara Island and includes *Chondracanthus (Gigartina) canaliculatus*, *Gelidium* sp. and *Pterocladia capillacea*. The mussel taxon is *Mytilus* spp. with *Mytilus californianus* dominating at all sites. Horse mussels, *Septifer bifurcates* or *Brachydontes adamsianus* were scored as their own category, but are included in miscellaneous invertebrates in the tables. Misc. Algae and Misc. Animals include a variety of different species. Since 2001, we have identified most organisms to the species level and have added to them to the database; however, because most are rare and for ease of comparison to past data, they are lumped here for convenience. Bare Rock is just that, however we had no way to detect the presence of Cyanobacteria. The Other category is a “catch-all” category including unidentified points.

**Table B-1 Percent Cover of Index Species
Middle-East, Anacapa Island - spring 2006 (3/26/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	243	51	14	13	2	0	0	4	0	0	15	0	0	1	100
	244	47	9	7	24	0	0	3	0	0	3	0	7	0	100
	245	53	8	6	16	0	0	8	0	0	3	0	6	0	100
	Mean	50.33	10.33	8.67	14.00	.00	.00	5.00	.00	.00	7.00	.00	4.33	.33	100.00
	StDev	3.06	3.21	3.79	11.14	.00	.00	2.65	.00	.00	6.93	.00	3.79	.58	.00
Endocladia	240	9	2	1	44	7	23	0	0	0	12	0	0	2	100
	241	25	12	16	7	0	0	20	0	0	19	0	0	1	100
	242	43	25	2	15	0	0	0	0	0	15	0	0	0	100
	Mean	25.67	13.00	6.33	22.00	2.33	7.67	6.67	.00	.00	15.33	.00	.00	1.00	100.00
	StDev	17.01	11.53	8.39	19.47	4.04	13.28	11.55	.00	.00	3.51	.00	.00	1.00	.00
Silvetia (Rockweed)	53	6	1	2	11	0	14	43	12	0	11	0	0	0	100
	237	9	3	0	2	0	75	0	0	0	10	0	0	1	100
	469	5	0	4	1	0	52	3	0	0	34	1	0	0	100
	Mean	6.67	1.33	2.00	4.67	.00	47.00	15.33	4.00	.00	18.33	.33	.00	.33	100.00
	StDev	2.08	1.53	2.00	5.51	.00	30.81	24.01	6.93	.00	13.58	.58	.00	.58	.00
Mussels	476	0	1	0	0	0	0	94	0	0	5	0	0	0	100
	477	2	2	1	0	0	1	77	0	0	17	0	0	0	100
	478	3	2	0	0	0	0	91	0	0	4	0	0	0	100
	Mean	1.67	1.67	.33	.00	.00	.33	87.33	.00	.00	8.67	.00	.00	.00	100.00
	StDev	1.53	.58	.58	.00	.00	.58	9.07	.00	.00	7.23	.00	.00	.00	.00

**Table B-2 Percent Cover of Index Species
Middle-West, Anacapa Island - spring 2006 (3/26/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	447	39	57	0	0	0	0	1	0	1	2	0	0	0	100
	448	15	23	1	31	0	0	9	0	0	21	0	0	0	100
	449	26	17	0	15	0	0	0	0	0	37	5	0	0	100
	450	33	30	0	9	0	0	0	0	0	28	0	0	0	100
	451	35	9	0	40	0	0	0	1	0	15	0	0	0	100
	Mean	29.60	27.20	.20	19.00	.00	.00	2.00	.20	.20	20.60	1.00	.00	.00	100.00
	StDev	9.42	18.36	.45	16.29	.00	.00	3.94	.45	.45	13.24	2.24	.00	.00	.00
Endocladia	457	6	2	0	32	0	0	50	0	1	9	0	0	0	100
	458	24	9	3	23	0	0	36	0	0	3	2	0	0	100
	459	32	5	1	25	0	0	10	0	0	25	2	0	0	100
	460	34	29	0	25	0	0	0	0	0	10	2	0	0	100
	461	57	16	0	12	0	0	0	0	0	15	0	0	0	100
	Mean	30.60	12.20	.80	23.40	.00	.00	19.20	.00	.20	12.40	1.20	.00	.00	100.00
	StDev	18.43	10.76	1.30	7.23	.00	.00	22.65	.00	.45	8.23	1.10	.00	.00	.00
Silvetia (Rockweed)	452	25	6	0	2	0	61	0	0	0	5	1	0	0	100
	453	28	3	1	0	0	60	0	1	1	6	0	0	0	100
	454	28	0	5	13	0	0	1	0	0	53	0	0	0	100
	455	29	0	1	10	0	36	8	5	0	10	1	0	0	100
	456	36	2	0	0	0	42	9	2	0	9	0	0	0	100
	Mean	29.20	2.20	1.40	5.00	.00	39.80	3.60	1.60	.20	16.60	.40	.00	.00	100.00
	StDev	4.09	2.49	2.07	6.08	.00	24.80	4.51	2.07	.45	20.45	.55	.00	.00	.00
Mussels	462	14	1	0	2	0	0	73	0	0	9	1	0	0	100
	463	17	2	1	2	0	0	66	0	0	11	1	0	0	100
	464	14	1	0	1	0	0	78	0	0	6	0	0	0	100
	465	2	0	0	0	0	0	97	0	0	1	0	0	0	100
	466	0	0	0	0	0	0	99	0	0	1	0	0	0	100
	Mean	9.40	.80	.20	1.00	.00	.00	82.60	.00	.00	5.60	.40	.00	.00	100.00
	StDev	7.80	.84	.45	1.00	.00	.00	14.71	.00	.00	4.56	.55	.00	.00	.00

**Table B-3 Percent Cover of Index Species
S. Frenchy's Cove, Anacapa Island - spring 2006 (3/28/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	249	26	53	0	19	1	0	0	0	0	1	0	0	0	100
	250	7	74	0	19	0	0	0	0	0	0	0	0	0	100
	251	19	78	0	0	0	0	0	0	0	3	0	0	0	100
	252	16	58	0	10	0	0	1	0	0	15	0	0	0	100
	253	6	79	0	10	2	0	0	0	0	3	0	0	0	100
	Mean	14.80	68.40	.00	11.60	.60	.00	.20	.00	.00	4.40	.00	.00	.00	100.00
	StDev	8.41	12.05	.00	7.89	.89	.00	.45	.00	.00	6.07	.00	.00	.00	.00
Endocladia	154	3	33	0	57	0	0	2	0	0	5	0	0	0	100
	155	0	4	0	70	0	24	0	0	0	2	0	0	0	100
	256	5	7	0	70	2	5	0	0	0	11	0	0	0	100
	257	2	8	0	83	0	0	0	0	0	7	0	0	0	100
	258	3	9	0	59	0	27	0	0	0	2	0	0	0	100
	Mean	2.60	12.20	.00	67.80	.40	11.20	.40	.00	.00	5.40	.00	.00	.00	100.00
	StDev	1.82	11.78	.00	10.43	.89	13.26	.89	.00	.00	3.78	.00	.00	.00	.00
Silvetia (Rockweed)	259	6	7	0	0	0	70	0	0	0	16	1	0	0	100
	260	3	14	0	0	0	77	0	0	0	6	0	0	0	100
	261	6	14	0	0	0	41	0	0	0	39	0	0	0	100
	262	10	46	0	22	0	10	0	0	0	12	0	0	0	100
	263	2	4	0	1	0	88	0	0	0	5	0	0	0	100
	Mean	5.40	17.00	.00	4.60	.00	57.20	.00	.00	.00	15.60	.20	.00	.00	100.00
	StDev	3.13	16.79	.00	9.74	.00	31.60	.00	.00	.00	13.83	.45	.00	.00	.00
Mussels	201	1	0	0	1	0	0	72	3	0	20	3	0	0	100
	202	8	0	1	0	0	0	65	11	0	13	2	0	0	100
	264	6	0	0	0	0	0	79	5	0	8	2	0	0	100
	265	3	0	2	1	0	0	85	2	0	2	5	0	0	100
	266	13	3	2	0	0	0	72	1	0	7	2	0	0	100
	Mean	6.20	.60	1.00	.40	.00	.00	74.60	4.40	.00	10.00	2.80	.00	.00	100.00
	StDev	4.66	1.34	1.00	.55	.00	.00	7.64	3.97	.00	6.82	1.30	.00	.00	.00

**Table B-4 Percent Cover of Index Species
Scorpion Rock, Santa Cruz Island - Spring 2006 (3/25/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra-clita	Endo-cladia	Hespero-phycus	Silvetia	Mussels	Turf-weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	801	24	10	0	63	0	0	0	0	0	1	2	0	0	100
	802	25	29	1	42	0	0	2	0	1	0	0	0	0	100
	803	30	8	0	59	0	0	2	0	0	1	0	0	0	100
	804	7	23	0	65	0	0	1	0	0	2	2	0	0	100
	805	29	69	0	0	0	0	1	0	0	0	1	0	0	100
	Mean	23.00	27.80	.20	45.80	.00	.00	1.20	.00	.20	.80	1.00	.00	.00	100.00
	StDev	9.30	24.65	.45	27.16	.00	.00	.84	.00	.45	.84	1.00	.00	.00	.00
Endocladia	806	5	8	0	58	0	0	2	0	2	25	0	0	0	100
	807	1	3	0	52	0	0	8	7	5	24	0	0	0	100
	808	11	0	0	67	0	0	6	0	3	13	0	0	0	100
	809	8	4	0	77	0	0	1	0	2	8	0	0	0	100
	810	31	3	0	51	0	0	2	0	2	11	0	0	0	100
	Mean	11.20	3.60	.00	61.00	.00	.00	3.80	1.40	2.80	16.20	.00	.00	.00	100.00
	StDev	11.67	2.88	.00	10.98	.00	.00	3.03	3.13	1.30	7.79	.00	.00	.00	.00
Mussels	816	6	0	18	2	0	0	56	0	9	6	3	0	0	100
	817	5	0	17	3	0	0	5	47	0	22	1	0	0	100
	818	7	0	26	0	0	0	46	13	2	6	0	0	0	100
	819	13	1	47	6	0	0	13	4	7	8	1	0	0	100
	820	9	0	36	0	0	0	0	23	0	31	1	0	0	100
	Mean	8.00	.20	28.80	2.20	.00	.00	24.00	17.40	3.60	14.60	1.20	.00	.00	100.00
	StDev	3.16	.45	12.72	2.49	.00	.00	25.33	18.77	4.16	11.35	1.10	.00	.00	.00
Tetraclita	821	38	2	30	0	11	0	8	2	1	8	0	0	0	100
	822	38	0	6	27	0	0	10	0	0	19	0	0	0	100
	823	65	2	15	3	0	0	0	1	0	7	7	0	0	100
	824	50	1	18	16	0	0	0	0	0	13	2	0	0	100
	825	54	0	26	1	0	0	0	0	0	19	0	0	0	100
	Mean	49.00	1.00	19.00	9.40	2.20	.00	3.60	.60	.20	13.20	1.80	.00	.00	100.00
	StDev	11.45	1.00	9.43	11.76	4.92	.00	4.98	.89	.45	5.76	3.03	.00	.00	.00
Hesperophycus	811	42	6	0	12	35	0	0	0	1	4	0	0	0	100
	812	11	0	0	24	40	9	1	0	0	15	0	0	0	100
	813	9	0	0	24	25	32	0	0	0	9	1	0	0	100
	814	62	3	0	13	3	7	0	1	0	9	2	0	0	100
	815	7	8	0	18	45	8	0	0	0	14	0	0	0	100
	Mean	26.20	3.40	.00	18.20	29.60	11.20	.20	.20	.20	10.20	.60	.00	.00	100.00
	StDev	24.63	3.58	.00	5.76	16.61	12.15	.45	.45	.45	4.44	.89	.00	.00	.00

**Table B-5 Percent Cover of Index Species
Cat Rock, Anacapa Island - fall 2006 (11/20/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	31	3	46	0	11	38	0	0	0	0	0	2	0	0	100
	32	9	66	0	25	0	0	0	0	0	0	0	0	0	100
	33	9	20	0	6	60	4	0	0	0	1	0	0	0	100
	35	11	58	0	17	13	0	0	0	0	1	0	0	0	100
	36	21	36	0	9	27	4	0	0	0	1	2	0	0	100
	37	14	38	0	7	30	3	0	0	0	7	1	0	0	100
	38	23	64	0	13	0	0	0	0	0	0	0	0	0	100
	39	7	85	0	2	4	0	0	0	0	2	0	0	0	100
	135	13	77	0	7	2	0	0	0	0	1	0	0	0	100
	Mean	12.22	54.44	.00	10.78	19.33	1.22	.00	.00	.00	1.44	.56	.00	.00	100.00
	StDev	6.44	21.06	.00	6.87	20.91	1.86	.00	.00	.00	2.19	.88	.00	.00	.00
Endocladia	13	8	14	8	57	0	0	7	0	0	4	2	0	0	100
	14	18	16	16	18	0	0	14	1	0	14	3	0	0	100
	19	15	11	0	45	0	19	0	0	0	10	0	0	0	100
	51	9	9	5	7	0	0	0	31	0	37	2	0	0	100
	52	3	0	10	30	0	0	6	25	0	25	1	0	0	100
	54	6	4	15	18	0	0	7	28	0	20	2	0	0	100
	212	8	6	2	75	0	0	4	0	0	4	1	0	0	100
	467	12	2	26	14	0	0	20	7	0	15	4	0	0	100
	492	9	4	4	54	2	10	1	1	0	11	4	0	0	100
	Mean	9.78	7.33	9.56	35.33	.22	3.22	6.56	10.33	.00	15.56	2.11	.00	.00	100.00
	StDev	4.58	5.50	8.25	23.38	.67	6.78	6.71	13.51	.00	10.55	1.36	.00	.00	.00
Silvetia (Rockweed)	2	7	29	1	21	27	12	0	0	0	3	0	0	0	100
	3	14	44	0	14	2	22	0	0	0	4	0	0	0	100
	4	60	20	0	9	3	4	0	0	0	4	0	0	0	100
	5	8	19	6	36	0	6	6	4	0	13	2	0	0	100
	6	2	4	0	7	14	73	0	0	0	0	0	0	0	100
	8	8	4	0	0	1	85	0	0	0	2	0	0	0	100
	9	2	0	0	2	4	91	0	0	0	1	0	0	0	100
	10	12	12	0	5	0	65	0	2	0	2	2	0	0	100
	55	6	33	2	24	13	0	7	6	0	9	0	0	0	100
	Mean	13.22	18.33	1.00	13.11	7.11	39.78	1.44	1.33	.00	4.22	.44	.00	.00	100.00
	StDev	17.98	14.91	2.00	11.84	9.14	37.91	2.88	2.24	.00	4.18	.88	.00	.00	.00

**Table B-5 Percent Cover of Index Species
Cat Rock, Anacapa Island - fall 2006 (11/20/06)(continued)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Mussels	56	3	2	28	0	0	0	50	0	0	15	2	0	0	100
	164	9	0	14	0	0	0	66	1	0	8	2	0	0	100
	203	7	7	5	3	0	0	50	7	0	17	4	0	0	100
	204	4	1	5	1	0	0	86	0	0	2	1	0	0	100
	468	1	0	20	1	0	0	38	5	0	34	1	0	0	100
	470	20	2	11	5	0	0	30	5	0	18	9	0	0	100
	471	5	1	14	13	0	0	36	6	0	25	0	0	0	100
	472	2	0	12	0	0	0	83	0	0	3	0	0	0	100
	473	20	1	16	1	0	0	41	2	0	16	3	0	0	100
	Mean	7.89	1.56	13.89	2.67	.00	.00	53.33	2.89	.00	15.33	2.44	.00	.00	100.00
	StDev	7.29	2.19	7.17	4.21	.00	.00	20.50	2.85	.00	10.22	2.79	.00	.00	.00

**Table B-6 Percent Cover of Index Species
Middle-East, Anacapa Island - fall 2006 (11/21/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	243	44	13	26	0	0	0	5	0	0	12	0	0	0	100
	244	60	5	5	15	0	0	3	0	0	11	1	0	0	100
	245	62	9	6	12	0	0	2	0	0	8	1	0	0	100
	Mean	55.33	9.00	12.33	9.00	.00	.00	3.33	.00	.00	10.33	.67	.00	.00	100.00
	StDev	9.87	4.00	11.85	7.94	.00	.00	1.53	.00	.00	2.08	.58	.00	.00	.00
Endocladia	240	19	2	0	24	0	29	0	0	0	26	0	0	0	100
	241	27	6	19	5	20	0	0	0	0	22	0	0	1	100
	242	41	27	4	20	0	0	1	0	0	7	0	0	0	100
	Mean	29.00	11.67	7.67	16.33	6.67	9.67	.33	.00	.00	18.33	.00	.00	.33	100.00
	StDev	11.14	13.43	10.02	10.02	11.55	16.74	.58	.00	.00	10.02	.00	.00	.58	.00
Silvetia (Rockweed)	53	13	1	2	1	0	12	22	17	0	32	0	0	0	100
	237	3	5	0	0	0	89	0	0	0	3	0	0	0	100
	469	9	0	1	1	0	61	1	0	0	27	0	0	0	100
	Mean	8.33	2.00	1.00	.67	.00	54.00	7.67	5.67	.00	20.67	.00	.00	.00	100.00
	StDev	5.03	2.65	1.00	.58	.00	38.97	12.42	9.81	.00	15.50	.00	.00	.00	.00
Mussels	476	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	477	0	0	2	0	0	0	96	0	0	2	0	0	0	100
	478	2	0	1	0	0	0	92	0	0	4	0	0	1	100
	Mean	.67	.00	1.00	.00	.00	.00	96.00	.00	.00	2.00	.00	.00	.33	100.00
	StDev	1.15	.00	1.00	.00	.00	.00	4.00	.00	.00	2.00	.00	.00	.58	.00

**Table B-7 Percent Cover of Index Species
Middle-West, Anacapa Island - fall 2006 (11/21/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	447	32	65	0	0	0	0	0	0	0	3	0	0	0	100
	448	11	16	1	19	0	0	7	7	0	39	0	0	0	100
	449	40	17	0	1	0	0	1	0	0	41	0	0	0	100
	450	47	33	0	5	0	0	1	0	0	14	0	0	0	100
	451	34	15	0	26	0	0	1	1	0	23	0	0	0	100
	Mean	32.80	29.20	.20	10.20	.00	.00	2.00	1.60	.00	24.00	.00	.00	.00	100.00
	StDev	13.52	21.34	.45	11.65	.00	.00	2.83	3.05	.00	16.25	.00	.00	.00	.00
Endocladia	457	6	0	0	17	0	0	54	0	0	23	0	0	0	100
	458	38	2	0	3	9	0	33	0	2	12	1	0	0	100
	459	29	6	0	1	17	0	13	1	0	32	1	0	0	100
	460	36	39	0	13	0	0	1	1	1	9	0	0	0	100
	461	65	24	0	7	0	0	0	0	0	4	0	0	0	100
	Mean	34.80	14.20	.00	8.20	5.20	.00	20.20	.40	.60	16.00	.40	.00	.00	100.00
	StDev	21.14	16.80	.00	6.72	7.66	.00	23.10	.55	.89	11.34	.55	.00	.00	.00
Silvetia (Rockweed)	452	18	2	3	3	0	70	0	0	0	4	0	0	0	100
	453	11	5	0	0	0	75	0	0	0	9	0	0	0	100
	454	7	0	0	12	0	0	2	22	0	56	1	0	0	100
	455	7	0	0	5	0	38	15	11	0	24	0	0	0	100
	456	16	0	1	0	0	40	18	2	0	19	4	0	0	100
	Mean	11.80	1.40	.80	4.00	.00	44.60	7.00	7.00	.00	22.40	1.00	.00	.00	100.00
	StDev	5.07	2.19	1.30	4.95	.00	30.10	8.77	9.54	.00	20.38	1.73	.00	.00	.00
Mussels	462	21	0	2	0	0	0	66	3	1	7	0	0	0	100
	463	24	0	4	0	0	0	56	1	1	14	0	0	0	100
	464	12	0	1	0	0	0	80	0	0	7	0	0	0	100
	465	5	0	0	0	0	0	93	0	0	2	0	0	0	100
	466	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	Mean	12.40	.00	1.40	.00	.00	.00	79.00	.80	.40	6.00	.00	.00	.00	100.00
	StDev	10.21	.00	1.67	.00	.00	.00	18.28	1.30	.55	5.43	.00	.00	.00	.00

**Table B-8 Percent Cover of Index Species
S. Frenchy's Cove, Anacapa Island - fall 2006 (11/22/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	249	11	48	0	32	0	0	0	0	0	8	1	0	0	100
	250	16	55	0	27	0	0	0	0	0	1	0	1	0	100
	251	9	86	0	5	0	0	0	0	0	0	0	0	0	100
	252	16	64	0	16	0	1	1	0	0	0	1	1	0	100
	253	7	56	0	21	15	0	0	0	0	1	0	0	0	100
	Mean	11.80	61.80	.00	20.20	3.00	.20	.20	.00	.00	2.00	.40	.40	.00	100.00
	StDev	4.09	14.67	.00	10.43	6.71	.45	.45	.00	.00	3.39	.55	.55	.00	.00
Endocladia	154	6	8	0	83	0	2	0	0	0	1	0	0	0	100
	155	6	0	0	80	0	12	0	0	0	2	0	0	0	100
	256	6	0	0	69	2	3	0	1	0	18	0	1	0	100
	257	5	0	0	90	0	0	0	0	0	5	0	0	0	100
	258	18	0	0	46	0	35	0	0	0	1	0	0	0	100
	Mean	8.20	1.60	.00	73.60	.40	10.40	.00	.20	.00	5.40	.00	.20	.00	100.00
	StDev	5.50	3.58	.00	17.18	.89	14.50	.00	.45	.00	7.23	.00	.45	.00	.00
Silvetia (Rockweed)	259	10	3	0	0	0	65	0	0	0	22	0	0	0	100
	260	0	6	0	1	0	85	0	0	0	8	0	0	0	100
	261	14	9	0	0	0	44	0	6	0	25	2	0	0	100
	262	17	28	0	23	2	19	0	9	0	2	0	0	0	100
	263	1	1	0	0	0	98	0	0	0	0	0	0	0	100
	Mean	8.40	9.40	.00	4.80	.40	62.20	.00	3.00	.00	11.40	.40	.00	.00	100.00
	StDev	7.64	10.83	.00	10.18	.89	31.65	.00	4.24	.00	11.48	.89	.00	.00	.00
Mussels	201	0	0	0	0	0	0	94	3	0	3	0	0	0	100
	202	6	0	0	0	0	0	90	1	0	2	1	0	0	100
	264	4	0	0	0	0	0	88	1	0	7	0	0	0	100
	265	2	0	0	0	0	0	95	0	0	3	0	0	0	100
	266	8	0	0	0	0	0	80	3	0	9	0	0	0	100
	Mean	4.00	.00	.00	.00	.00	.00	89.40	1.60	.00	4.80	.20	.00	.00	100.00
	StDev	3.16	.00	.00	.00	.00	.00	5.98	1.34	.00	3.03	.45	.00	.00	.00

**Table B-9 Percent Cover of Index Species
Crook Point, San Miguel Island - fall 2006 (1/19/07)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	137	59	41	0	0	0	0	0	0	0	0	0	0	0	100
	147	52	46	0	0	0	0	0	0	0	1	1	0	0	100
	148	25	75	0	0	0	0	0	0	0	0	0	0	0	100
	149	64	12	0	20	0	0	3	0	0	1	0	0	0	100
	495	23	62	0	13	0	0	1	0	0	1	0	0	0	100
	Mean	44.60	47.20	.00	6.60	.00	.00	.80	.00	.00	.60	.20	.00	.00	100.00
	StDev	19.30	23.83	.00	9.37	.00	.00	1.30	.00	.00	.55	.45	.00	.00	.00
Endocladia	386	66	5	1	13	11	0	2	0	0	0	2	0	0	100
	387	48	0	3	27	0	0	0	0	0	19	3	0	0	100
	388	46	11	0	15	18	0	1	0	0	9	0	0	0	100
	389	10	0	0	33	0	18	38	0	1	0	0	0	0	100
	390	22	13	0	18	0	2	17	0	3	24	1	0	0	100
	Mean	38.40	5.80	.80	21.20	5.80	4.00	11.60	.00	.80	10.40	1.20	.00	.00	100.00
	StDev	22.29	6.06	1.30	8.50	8.32	7.87	16.32	.00	1.30	10.92	1.30	.00	.00	.00
Silvetia (Rockweed)	396	16	4	0	38	11	0	23	0	3	5	0	0	0	100
	397	7	2	0	0	0	0	91	0	0	0	0	0	0	100
	398	44	19	0	4	0	1	28	0	0	4	0	0	0	100
	399	27	0	0	0	0	1	1	12	0	56	3	0	0	100
	400	57	0	1	24	7	0	6	0	1	4	0	0	0	100
	Mean	30.20	5.00	.20	13.20	3.60	.40	29.80	2.40	.80	13.80	.60	.00	.00	100.00
	StDev	20.36	8.00	.45	17.06	5.13	.55	36.02	5.37	1.30	23.67	1.34	.00	.00	.00
Mussels	381	24	1	1	0	0	0	62	1	0	9	2	0	0	100
	382	2	0	0	0	0	0	94	0	0	4	0	0	0	100
	383	9	0	0	0	0	0	84	0	0	7	0	0	0	100
	384	10	0	1	0	0	0	80	0	1	8	0	0	0	100
	385	16	0	2	0	0	0	65	0	2	14	1	0	0	100
	Mean	12.20	.20	.80	.00	.00	.00	77.00	.20	.60	8.40	.60	.00	.00	100.00
	StDev	8.26	.45	.84	.00	.00	.00	13.38	.45	.89	3.65	.89	.00	.00	.00

**Table B-10 Percent Cover of Index Species
Cuyler Harbor, San Miguel Island - fall 2006 (1/16/07)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	416	22	77	0	0	0	0	0	0	0	0	1	0	0	100
	417	25	53	0	22	0	0	0	0	0	0	0	0	0	100
	418	17	66	0	16	0	0	1	0	0	0	0	0	0	100
	419	34	22	0	38	0	4	0	0	0	2	0	0	0	100
	420	24	14	0	61	0	0	0	0	0	1	0	0	0	100
	Mean	24.40	46.40	.00	27.40	.00	.80	.20	.00	.00	.60	.20	.00	.00	100.00
	StDev	6.19	27.43	.00	23.19	.00	1.79	.45	.00	.00	.89	.45	.00	.00	.00
Endocladia	411	29	0	0	36	0	0	16	0	0	19	0	0	0	100
	412	20	27	0	15	0	0	31	1	1	5	0	0	0	100
	413	13	0	0	17	0	54	0	0	0	16	0	0	0	100
	414	53	0	0	23	0	0	0	3	0	20	1	0	0	100
	415	20	0	0	55	0	2	0	0	0	23	0	0	0	100
	Mean	27.00	5.40	.00	29.20	.00	11.20	9.40	.80	.20	16.60	.20	.00	.00	100.00
	StDev	15.60	12.07	.00	16.59	.00	23.94	13.92	1.30	.45	6.95	.45	.00	.00	.00
Silvetia (Rockweed)	406	16	0	0	5	0	54	2	0	0	14	9	0	0	100
	407	24	0	0	1	0	63	0	0	0	11	1	0	0	100
	408	11	0	6	3	0	70	0	0	0	9	1	0	0	100
	409	12	0	0	2	0	69	0	0	0	12	5	0	0	100
	410	25	0	4	1	0	56	0	0	0	10	4	0	0	100
	Mean	17.60	.00	2.00	2.40	.00	62.40	.40	.00	.00	11.20	4.00	.00	.00	100.00
	StDev	6.58	.00	2.83	1.67	.00	7.30	.89	.00	.00	1.92	3.32	.00	.00	.00
Mussels	401	35	0	3	0	0	0	18	3	5	18	18	0	0	100
	402	4	0	0	0	0	0	81	3	1	7	4	0	0	100
	403	10	0	1	0	0	0	79	1	2	1	6	0	0	100
	404	31	0	11	0	0	0	17	12	0	14	15	0	0	100
	405	27	0	9	0	0	0	46	7	2	7	2	0	0	100
	Mean	21.40	.00	4.80	.00	.00	.00	48.20	5.20	2.00	9.40	9.00	.00	.00	100.00
	StDev	13.61	.00	4.92	.00	.00	.00	31.28	4.38	1.87	6.66	7.07	.00	.00	.00

**Table B-11 Percent Cover of Index Species
Harris Point, San Miguel Island - fall 2006 (1/18/07)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	440	8	76	0	12	3	0	0	0	0	1	0	0	0	100
	441	15	80	0	3	0	0	0	0	0	0	2	0	0	100
	442	23	71	0	6	0	0	0	0	0	0	0	0	0	100
	443	19	76	0	0	0	0	0	0	0	0	0	5	0	100
	444	28	67	0	5	0	0	0	0	0	0	0	0	0	100
	Mean	18.60	74.00	.00	5.20	.60	.00	.00	.00	.00	.20	.40	1.00	.00	100.00
	StDev	7.64	5.05	.00	4.44	1.34	.00	.00	.00	.00	.45	.89	2.24	.00	.00
Endocladia	431	30	5	1	38	1	0	11	1	0	11	2	0	0	100
	432	10	28	0	38	9	0	4	2	0	9	0	0	0	100
	433	23	22	0	42	6	0	1	0	0	6	0	0	0	100
	434	37	1	0	50	6	0	0	0	0	5	1	0	0	100
	435	4	0	0	29	52	0	0	0	0	15	0	0	0	100
	Mean	20.80	11.20	.20	39.40	14.80	.00	3.20	.60	.00	9.20	.60	.00	.00	100.00
	StDev	13.70	12.91	.45	7.60	20.99	.00	4.66	.89	.00	4.02	.89	.00	.00	.00
Mussels	426	11	0	0	4	0	0	68	0	2	10	5	0	0	100
	427	13	0	1	13	2	0	0	4	0	67	0	0	0	100
	428	34	0	0	7	3	0	4	0	0	52	0	0	0	100
	429	33	0	4	0	0	0	54	0	0	9	0	0	0	100
	430	7	0	2	0	0	0	73	0	0	18	0	0	0	100
	Mean	19.60	.00	1.40	4.80	1.00	.00	39.80	.80	.40	31.20	1.00	.00	.00	100.00
	StDev	12.88	.00	1.67	5.45	1.41	.00	35.23	1.79	.89	26.60	2.24	.00	.00	.00
Tetraclita	436	17	1	0	23	0	0	41	0	0	15	3	0	0	100
	437	17	2	20	0	0	0	33	0	0	24	4	0	0	100
	438	14	0	1	3	0	0	1	15	0	66	0	0	0	100
	439	4	4	2	6	0	1	0	10	0	71	2	0	0	100
	445	30	0	12	1	0	0	26	10	1	17	3	0	0	100
	Mean	16.40	1.40	7.00	6.60	.00	.20	20.20	7.00	.20	38.60	2.40	.00	.00	100.00
	StDev	9.29	1.67	8.72	9.45	.00	.45	18.75	6.71	.45	27.56	1.52	.00	.00	.00
Hesperophycus	421	8	0	0	22	69	0	0	0	0	1	0	0	0	100
	422	19	0	0	23	48	0	1	2	0	5	2	0	0	100
	423	9	0	0	54	28	0	0	0	0	9	0	0	0	100
	424	14	0	0	31	54	0	0	0	0	1	0	0	0	100
	425	22	0	0	11	60	0	0	0	0	7	0	0	0	100
	Mean	14.40	.00	.00	28.20	51.80	.00	.20	.40	.00	4.60	.40	.00	.00	100.00
	StDev	6.11	.00	.00	16.08	15.40	.00	.45	.89	.00	3.58	.89	.00	.00	.00

**Table B-12 Percent Cover of Index Species
Otter Harbor, San Miguel Island - fall 2006 (1/17/07)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	370	4	19	0	0	0	0	0	0	0	77	0	0	0	100
	371	13	77	0	0	0	0	0	0	0	4	0	6	0	100
	372	57	38	0	0	0	0	0	0	0	2	3	0	0	100
	373	5	56	0	0	0	0	0	0	0	38	0	1	0	100
	374	0	0	0	0	0	0	0	16	0	83	1	0	0	100
	Mean	15.80	38.00	.00	.00	.00	.00	.00	3.20	.00	40.80	.80	1.40	.00	100.00
	StDev	23.51	30.21	.00	.00	.00	.00	.00	7.16	.00	38.60	1.30	2.61	.00	.00
Endocladia	360	24	21	5	27	0	15	4	0	0	4	0	0	0	100
	361	54	0	0	36	0	0	1	0	0	4	5	0	0	100
	362	0	0	0	77	0	0	0	2	1	20	0	0	0	100
	363	24	0	0	33	0	2	0	0	0	41	0	0	0	100
	364	6	0	0	48	1	20	0	0	0	24	1	0	0	100
	Mean	21.60	4.20	1.00	44.20	.20	7.40	1.00	.40	.20	18.60	1.20	.00	.00	100.00
	StDev	21.04	9.39	2.24	19.87	.45	9.42	1.73	.89	.45	15.49	2.17	.00	.00	.00
Silvetia (Rockweed)	355	52	28	0	0	0	0	0	0	0	15	2	3	0	100
	356	18	3	0	34	0	37	0	0	0	8	0	0	0	100
	357	23	0	0	38	0	16	0	0	0	23	0	0	0	100
	358	22	55	0	19	0	0	0	0	0	2	2	0	0	100
	359	14	60	0	15	0	0	0	0	0	9	1	1	0	100
	Mean	25.80	29.20	.00	21.20	.00	10.60	.00	.00	.00	11.40	1.00	.80	.00	100.00
	StDev	15.07	28.08	.00	15.32	.00	16.30	.00	.00	.00	7.96	1.00	1.30	.00	.00
Mussels	375	24	0	2	2	0	0	51	1	7	11	2	0	0	100
	376	34	0	0	0	0	0	38	1	4	19	4	0	0	100
	378	10	0	1	0	0	0	49	1	11	27	1	0	0	100
	379	18	0	1	0	0	0	49	5	0	27	0	0	0	100
	380	13	0	1	0	0	0	41	0	3	39	3	0	0	100
	Mean	19.80	.00	1.00	.40	.00	.00	45.60	1.60	5.00	24.60	2.00	.00	.00	100.00
	StDev	9.55	.00	.71	.89	.00	.00	5.73	1.95	4.18	10.43	1.58	.00	.00	.00

**Table B-13 Percent Cover of Index Species
Landing Cove, Santa Barbara Island - fall 2006 (11/2/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	315	48	25	5	6	0	0	1	7	0	8	0	0	0	100
	316	18	6	4	0	0	0	0	30	0	41	1	0	0	100
	317	15	9	10	0	0	0	10	25	0	30	1	0	0	100
	318	13	2	31	0	0	0	42	1	1	10	0	0	0	100
	319	27	12	5	5	0	0	2	25	0	22	2	0	0	100
	Mean	24.20	10.80	11.00	2.20	.00	.00	11.00	17.60	.20	22.20	.80	.00	.00	100.00
	StDev	14.34	8.76	11.42	3.03	.00	.00	17.78	12.76	.45	13.83	.84	.00	.00	.00
Silvetia (Rockweed)	310	21	0	0	0	0	3	1	11	0	63	1	0	0	100
	311	15	2	0	0	0	2	1	17	1	62	0	0	0	100
	312	11	0	0	0	0	4	0	14	0	71	0	0	0	100
	313	12	0	0	0	0	0	1	20	0	67	0	0	0	100
	314	19	0	0	0	0	15	1	19	0	46	0	0	0	100
	Mean	15.60	.40	.00	.00	.00	4.80	.80	16.20	.20	61.80	.20	.00	.00	100.00
	StDev	4.34	.89	.00	.00	.00	5.89	.45	3.70	.45	9.52	.45	.00	.00	.00
Mussels	325	0	0	0	0	0	0	99	0	1	0	0	0	0	100
	326	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	327	0	0	0	0	0	0	97	0	3	0	0	0	0	100
	328	0	0	0	0	0	0	95	0	0	5	0	0	0	100
	329	1	0	9	0	0	0	78	0	0	4	8	0	0	100
	Mean	.20	.00	1.80	.00	.00	.00	93.80	.00	.80	1.80	1.60	.00	.00	100.00
	StDev	.45	.00	4.02	.00	.00	.00	9.04	.00	1.30	2.49	3.58	.00	.00	.00
Red Algal Turf	320	1	0	0	0	0	0	0	91	0	8	0	0	0	100
	321	0	0	0	0	0	0	23	63	0	14	0	0	0	100
	322	0	0	0	0	0	0	16	7	0	4	2	0	71	100
	323	0	0	0	0	0	0	0	3	0	2	0	0	95	100
	324	0	0	0	0	0	0	0	72	0	27	1	0	0	100
	Mean	.20	.00	.00	.00	.00	.00	7.80	47.20	.00	11.00	.60	.00	33.20	100.00
	StDev	.45	.00	.00	.00	.00	.00	10.96	39.85	.00	10.05	.89	.00	46.25	.00

**Table B-14 Percent Cover of Index Species
Sea Lion Rookery, Santa Barbara Island - fall 2006 (11/4/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	345	40	11	2	5	0	0	4	3	0	35	0	0	0	100
	346	68	12	0	2	0	0	0	0	0	18	0	0	0	100
	347	52	21	0	0	0	0	1	0	0	26	0	0	0	100
	348	23	7	1	1	0	0	0	0	0	68	0	0	0	100
	349	54	16	2	0	0	0	0	0	0	28	0	0	0	100
	Mean	47.40	13.40	1.00	1.60	.00	.00	1.00	.60	.00	35.00	.00	.00	.00	100.00
	StDev	16.88	5.32	1.00	2.07	.00	.00	1.73	1.34	.00	19.42	.00	.00	.00	.00
Endocladia	335	23	6	14	3	0	0	5	0	0	48	1	0	0	100
	336	14	1	2	2	0	0	1	0	0	80	0	0	0	100
	337	19	2	1	5	0	0	10	1	0	62	0	0	0	100
	338	21	1	7	15	0	1	0	0	3	51	1	0	0	100
	339	25	4	13	9	0	0	1	0	0	47	1	0	0	100
	Mean	20.40	2.80	7.40	6.80	.00	.20	3.40	.20	.60	57.60	.60	.00	.00	100.00
	StDev	4.22	2.17	6.02	5.31	.00	.45	4.16	.45	1.34	13.87	.55	.00	.00	.00
Silvetia (Rockweed)	330	40	2	15	1	0	0	34	1	0	3	4	0	0	100
	331	15	0	1	1	0	59	4	5	0	15	0	0	0	100
	332	12	1	1	1	0	49	1	9	0	26	0	0	0	100
	333	8	0	1	1	0	30	3	29	0	25	3	0	0	100
	334	8	0	0	0	0	49	1	0	0	42	0	0	0	100
	Mean	16.60	.60	3.60	.80	.00	37.40	8.60	8.80	.00	22.20	1.40	.00	.00	100.00
	StDev	13.41	.89	6.39	.45	.00	23.39	14.26	11.84	.00	14.45	1.95	.00	.00	.00
Mussels	350	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	351	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	352	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	353	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	354	0	0	0	0	0	0	91	0	6	3	0	0	0	100
	Mean	.00	.00	.00	.00	.00	.00	98.20	.00	1.20	.60	.00	.00	.00	100.00
	StDev	.00	.00	.00	.00	.00	.00	4.02	.00	2.68	1.34	.00	.00	.00	.00

**Table B-15 Percent Cover of Index Species
Fraser Cove, Santa Cruz Island - fall 2006 (12/19/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	876	40	46	0	9	0	0	3	0	0	1	1	0	0	100
	877	46	42	0	7	0	0	5	0	0	0	0	0	0	100
	878	14	84	0	0	0	0	0	0	0	1	0	1	0	100
	879	49	47	0	0	0	0	0	0	0	0	2	2	0	100
	880	56	40	0	0	0	0	0	0	0	3	0	1	0	100
	Mean	41.00	51.80	.00	3.20	.00	.00	1.60	.00	.00	1.00	.60	.80	.00	100.00
	StDev	16.16	18.23	.00	4.44	.00	.00	2.30	.00	.00	1.22	.89	.84	.00	.00
Endocladia	881	44	1	0	41	0	0	6	0	0	8	0	0	0	100
	882	27	6	0	58	0	0	4	0	0	5	0	0	0	100
	883	15	1	0	75	7	0	2	0	0	0	0	0	0	100
	884	40	3	0	56	0	0	0	0	0	1	0	0	0	100
	885	23	2	0	72	0	0	0	0	0	2	1	0	0	100
	Mean	29.80	2.60	.00	60.40	1.40	.00	2.40	.00	.00	3.20	.20	.00	.00	100.00
	StDev	12.03	2.07	.00	13.69	3.13	.00	2.61	.00	.00	3.27	.45	.00	.00	.00
Silvetia (Rockweed)	896	31	18	0	27	4	20	0	0	0	0	0	0	0	100
	897	21	8	0	2	5	59	0	0	0	5	0	0	0	100
	898	20	4	0	2	1	68	0	0	0	5	0	0	0	100
	899	24	19	0	6	1	45	0	0	0	4	1	0	0	100
	900	8	15	0	4	2	71	0	0	0	0	0	0	0	100
	Mean	20.80	12.80	.00	8.20	2.60	52.60	.00	.00	.00	2.80	.20	.00	.00	100.00
	StDev	8.35	6.53	.00	10.64	1.82	20.84	.00	.00	.00	2.59	.45	.00	.00	.00
Mussels	891	9	0	0	0	0	0	68	1	1	17	4	0	0	100
	892	20	0	0	0	0	0	71	1	0	5	3	0	0	100
	893	7	0	0	0	0	0	87	0	1	1	4	0	0	100
	894	15	0	0	1	0	0	82	0	0	0	2	0	0	100
	895	11	0	0	0	0	0	85	1	0	1	2	0	0	100
	Mean	12.40	.00	.00	.20	.00	.00	78.60	.60	.40	4.80	3.00	.00	.00	100.00
	StDev	5.18	.00	.00	.45	.00	.00	8.56	.55	.55	7.09	1.00	.00	.00	.00
Pollicipes	901	29	1	5	1	0	0	60	0	3	0	1	0	0	100
	902	40	0	1	12	0	0	19	0	2	7	19	0	0	100
	903	7	0	0	0	0	0	72	0	10	0	11	0	0	100
	904	11	0	0	0	0	0	80	0	4	0	5	0	0	100
	905	8	0	0	0	0	0	69	1	10	4	8	0	0	100
	Mean	19.00	.20	1.20	2.60	.00	.00	60.00	.20	5.80	2.20	8.80	.00	.00	100.00
	StDev	14.75	.45	2.17	5.27	.00	.00	24.01	.45	3.90	3.19	6.80	.00	.00	.00

**Table B-15 Percent Cover of Index Species
Fraser Cove, Santa Cruz Island - fall 2006 (12/19/06)(continued)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Tar	906	18	39	0	0	0	0	0	0	0	3	0	40	0	100
	907	22	46	0	0	0	0	0	0	0	2	0	30	0	100
	908	22	32	0	0	0	0	0	0	0	2	0	44	0	100
	909	32	28	0	0	0	0	0	0	0	1	0	39	0	100
	910	15	22	0	0	0	0	0	0	0	0	0	63	0	100
	Mean	21.80	33.40	.00	.00	.00	.00	.00	.00	.00	1.60	.00	43.20	.00	100.00
	StDev	6.42	9.37	.00	.00	.00	.00	.00	.00	.00	1.14	.00	12.19	.00	.00
Hesperophycus	886	34	1	0	9	54	0	0	0	0	1	1	0	0	100
	887	45	5	0	5	31	0	0	0	0	14	0	0	0	100
	888	15	33	0	31	19	2	0	0	0	0	0	0	0	100
	889	43	33	0	8	13	1	0	0	0	2	0	0	0	100
	890	16	9	0	24	15	36	0	0	0	0	0	0	0	100
	Mean	30.60	16.20	.00	15.40	26.40	7.80	.00	.00	.00	3.40	.20	.00	.00	100.00
	StDev	14.40	15.59	.00	11.41	16.94	15.79	.00	.00	.00	5.98	.45	.00	.00	.00

**Table B-16 Percent Cover of Index Species
Prisoner's Harbor, Santa Cruz Island - fall 2006 (12/17/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra-clita	Endo-cladia	Hespero-phycus	Silvetia	Mussels	Turf-weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	826	99	0	0	0	0	0	0	0	0	0	1	0	0	100
	827	49	22	1	3	0	0	1	11	0	12	1	0	0	100
	828	18	17	0	33	0	0	1	8	0	23	0	0	0	100
	829	17	19	3	18	0	0	1	6	0	34	2	0	0	100
	830	19	10	0	16	1	0	0	3	0	48	3	0	0	100
	Mean	40.40	13.60	.80	14.00	.20	.00	.60	5.60	.00	23.40	1.40	.00	.00	100.00
	StDev	35.41	8.79	1.30	13.21	.45	.00	.55	4.28	.00	18.68	1.14	.00	.00	.00
Endocladia	831	27	2	0	39	1	0	1	0	0	29	1	0	0	100
	832	37	1	0	48	10	0	0	0	0	3	1	0	0	100
	833	39	22	0	33	4	0	1	0	0	1	0	0	0	100
	834	37	15	0	38	4	0	0	0	0	4	2	0	0	100
	835	16	11	0	35	29	0	8	0	0	1	0	0	0	100
	Mean	31.20	10.20	.00	38.60	9.60	.00	2.00	.00	.00	7.60	.80	.00	.00	100.00
	StDev	9.71	8.87	.00	5.77	11.33	.00	3.39	.00	.00	12.03	.84	.00	.00	.00
Silvetia (Rockweed)	846	19	26	3	20	0	0	1	5	0	26	0	0	0	100
	847	31	37	5	2	0	0	2	3	0	16	4	0	0	100
	848	40	2	2	0	0	11	5	0	0	39	1	0	0	100
	849	27	3	0	0	0	49	2	0	0	18	1	0	0	100
	850	6	0	0	0	0	67	3	0	0	24	0	0	0	100
	Mean	24.60	13.60	2.00	4.40	.00	25.40	2.60	1.60	.00	24.60	1.20	.00	.00	100.00
	StDev	12.86	16.83	2.12	8.76	.00	30.76	1.52	2.30	.00	9.04	1.64	.00	.00	.00
Mussels	841	0	0	0	0	0	0	99	0	0	0	1	0	0	100
	842	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	843	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	844	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	845	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	Mean	.00	.00	.00	.00	.00	.00	99.80	.00	.00	.00	.20	.00	.00	100.00
	StDev	.00	.00	.00	.00	.00	.00	.45	.00	.00	.00	.45	.00	.00	.00
Hesperophycus	836	35	22	0	27	10	0	3	0	0	1	2	0	0	100
	837	23	37	0	14	23	0	2	0	0	1	0	0	0	100
	838	38	24	0	20	11	0	2	0	0	5	0	0	0	100
	839	16	43	0	15	19	6	1	0	0	0	0	0	0	100
	840	20	52	0	18	8	0	0	2	0	0	0	0	0	100
	Mean	26.40	35.60	.00	18.80	14.20	1.20	1.60	.40	.00	1.40	.40	.00	.00	100.00
	StDev	9.61	12.70	.00	5.17	6.46	2.68	1.14	.89	.00	2.07	.89	.00	.00	.00

**Table B-17 Percent Cover of Index Species
Trailer, Santa Cruz Island - fall 2006 (12/19/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	911	19	74	0	7	0	0	0	0	0	0	0	0	0	100
	912	16	81	0	0	0	0	0	0	0	0	3	0	0	100
	913	19	63	0	16	0	0	1	0	0	0	1	0	0	100
	914	6	93	0	0	0	0	0	0	0	0	1	0	0	100
	915	29	67	0	0	0	0	0	0	0	0	4	0	0	100
	Mean	17.80	75.60	.00	4.60	.00	.00	.20	.00	.00	.00	1.80	.00	.00	100.00
	StDev	8.23	11.91	.00	7.06	.00	.00	.45	.00	.00	.00	1.64	.00	.00	.00
Silvetia (Rockweed)	926	6	0	0	0	0	89	0	0	0	5	0	0	0	100
	927	14	12	0	0	0	74	0	0	0	0	0	0	0	100
	928	12	8	0	9	0	70	0	0	0	1	0	0	0	100
	929	2	3	0	0	0	95	0	0	0	0	0	0	0	100
	930	6	4	0	0	0	87	0	0	0	3	0	0	0	100
	Mean	8.00	5.40	.00	1.80	.00	83.00	.00	.00	.00	1.80	.00	.00	.00	100.00
	StDev	4.90	4.67	.00	4.02	.00	10.56	.00	.00	.00	2.17	.00	.00	.00	.00
Mussels	921	24	0	0	0	0	0	3	5	1	24	43	0	0	100
	922	4	0	0	0	0	0	65	1	0	19	11	0	0	100
	923	14	0	0	0	0	0	26	0	0	51	9	0	0	100
	924	22	3	0	0	0	0	57	0	0	10	8	0	0	100
	925	21	0	1	0	0	0	57	0	0	11	10	0	0	100
	Mean	17.00	.60	.20	.00	.00	.00	41.60	1.20	.20	23.00	16.20	.00	.00	100.00
	StDev	8.19	1.34	.45	.00	.00	.00	26.24	2.17	.45	16.69	15.02	.00	.00	.00
Hesperophycus	916	20	8	0	10	19	40	0	0	0	3	0	0	0	100
	917	11	1	0	9	9	70	0	0	0	0	0	0	0	100
	918	10	0	0	6	25	59	0	0	0	0	0	0	0	100
	919	31	60	0	8	0	0	0	0	0	0	1	0	0	100
	920	12	20	0	26	30	9	0	0	0	3	0	0	0	100
	951	29	35	0	15	21	0	0	0	0	0	0	0	0	100
	Mean	18.83	20.67	.00	12.33	17.33	29.67	.00	.00	.00	1.00	.17	.00	.00	100.00
	StDev	9.37	23.36	.00	7.34	11.00	30.92	.00	.00	.00	1.55	.41	.00	.00	.00

**Table B-18 Percent Cover of Index Species
Willows Anchorage, Santa Cruz Island - fall 2006 (12/20/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Endocladia	931	17	5	0	77	0	0	0	0	0	1	0	0	0	100
	932	8	9	0	82	0	0	0	0	0	1	0	0	0	100
	933	16	10	0	71	0	0	0	0	0	2	1	0	0	100
	934	11	1	0	75	0	0	0	0	0	12	1	0	0	100
	935	15	16	5	49	0	0	0	0	0	14	1	0	0	100
	Mean	13.40	8.20	1.00	70.80	.00	.00	.00	.00	.00	6.00	.60	.00	.00	100.00
	StDev	3.78	5.63	2.24	12.81	.00	.00	.00	.00	.00	6.44	.55	.00	.00	.00
Silvetia (Rockweed)	946	6	9	0	48	0	0	0	0	0	37	0	0	0	100
	947	9	12	0	27	0	0	0	0	0	49	3	0	0	100
	948	9	21	0	0	0	49	0	2	0	17	2	0	0	100
	949	0	0	0	0	0	96	0	0	0	4	0	0	0	100
	950	15	33	0	21	0	0	0	1	0	30	0	0	0	100
	Mean	7.80	15.00	.00	19.20	.00	29.00	.00	.60	.00	27.40	1.00	.00	.00	100.00
	StDev	5.45	12.55	.00	20.19	.00	43.05	.00	.89	.00	17.47	1.41	.00	.00	.00
Mussels	941	7	0	6	0	0	0	80	0	1	4	2	0	0	100
	942	3	0	0	0	0	0	94	0	1	1	1	0	0	100
	943	1	0	0	0	0	0	99	0	0	0	0	0	0	100
	944	2	0	0	0	0	0	96	0	0	2	0	0	0	100
	945	2	0	0	0	0	0	92	0	0	3	3	0	0	100
	Mean	3.00	.00	1.20	.00	.00	.00	92.20	.00	.40	2.00	1.20	.00	.00	100.00
	StDev	2.35	.00	2.68	.00	.00	.00	7.29	.00	.55	1.58	1.30	.00	.00	.00
Hesperophycus	936	12	15	0	66	0	0	0	0	0	7	0	0	0	100
	937	27	47	0	1	0	1	0	0	0	23	1	0	0	100
	938	30	33	0	2	1	0	0	0	0	32	2	0	0	100
	939	8	0	0	1	5	80	0	0	0	6	0	0	0	100
	940	8	10	0	7	4	60	0	0	0	11	0	0	0	100
	Mean	17.00	21.00	.00	15.40	2.00	28.20	.00	.00	.00	15.80	.60	.00	.00	100.00
	StDev	10.68	18.83	.00	28.40	2.35	38.81	.00	.00	.00	11.30	.89	.00	.00	.00

**Table B-19 Percent Cover of Index Species
East Point, Santa Rosa Island - fall 2006 (12/3/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	575	37	62	0	0	0	0	0	0	0	0	1	0	0	100
	576	28	46	0	11	10	0	0	0	0	5	0	0	0	100
	577	24	17	0	47	9	0	0	0	0	3	0	0	0	100
	578	40	60	0	0	0	0	0	0	0	0	0	0	0	100
	579	6	86	0	8	0	0	0	0	0	0	0	0	0	100
	Mean	27.00	54.20	.00	13.20	3.80	.00	.00	.00	.00	1.60	.20	.00	.00	100.00
	StDev	13.42	25.28	.00	19.51	5.22	.00	.00	.00	.00	2.30	.45	.00	.00	.00
Endocladia	580	25	10	0	54	5	4	0	0	0	2	0	0	0	100
	581	13	8	0	73	4	1	0	0	0	1	0	0	0	100
	582	21	4	0	62	1	0	0	0	0	12	0	0	0	100
	583	9	9	0	78	3	0	0	0	0	0	1	0	0	100
	584	4	11	0	75	10	0	0	0	0	0	0	0	0	100
	Mean	14.40	8.40	.00	68.40	4.60	1.00	.00	.00	.00	3.00	.20	.00	.00	100.00
	StDev	8.59	2.70	.00	10.06	3.36	1.73	.00	.00	.00	5.10	.45	.00	.00	.00
Silvetia (Rockweed)	585	18	32	0	9	0	20	0	0	0	19	2	0	0	100
	586	21	9	0	10	1	35	0	0	0	21	3	0	0	100
	587	34	19	0	3	3	10	1	0	0	30	0	0	0	100
	588	1	2	0	0	0	89	0	0	0	6	2	0	0	100
	589	9	0	0	0	0	71	0	0	0	20	0	0	0	100
	Mean	16.60	12.40	.00	4.40	.80	45.00	.20	.00	.00	19.20	1.40	.00	.00	100.00
	StDev	12.50	13.24	.00	4.83	1.30	33.77	.45	.00	.00	8.58	1.34	.00	.00	.00
Mussels	590	1	0	0	0	0	0	95	0	0	4	0	0	0	100
	591	4	5	1	0	0	0	45	12	0	26	7	0	0	100
	592	1	0	0	0	0	0	87	0	0	11	1	0	0	100
	593	0	0	0	0	0	0	97	0	0	3	0	0	0	100
	594	1	1	0	0	0	0	89	0	0	9	0	0	0	100
	Mean	1.40	1.20	.20	.00	.00	.00	82.60	2.40	.00	10.60	1.60	.00	.00	100.00
	StDev	1.52	2.17	.45	.00	.00	.00	21.42	5.37	.00	9.24	3.05	.00	.00	.00
Hesperophycus	570	32	7	0	54	3	0	0	0	0	4	0	0	0	100
	571	8	37	0	34	20	0	0	0	0	1	0	0	0	100
	572	4	30	0	32	31	2	0	0	0	1	0	0	0	100
	573	1	35	0	42	20	1	0	0	0	1	0	0	0	100
	574	4	16	0	36	35	7	0	0	0	2	0	0	0	100
	Mean	9.80	25.00	.00	39.60	21.80	2.00	.00	.00	.00	1.80	.00	.00	.00	100.00
	StDev	12.66	12.98	.00	8.88	12.44	2.92	.00	.00	.00	1.30	.00	.00	.00	.00

**Table B-20 Percent Cover of Index Species
Ford Point, Santa Rosa Island - fall 2006 (11/30/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	520	59	35	0	0	0	0	0	0	0	0	6	0	0	100
	521	39	55	0	0	0	0	0	0	0	4	2	0	0	100
	522	47	43	0	0	0	0	0	0	0	7	3	0	0	100
	523	52	6	0	38	0	0	0	0	0	4	0	0	0	100
	524	22	74	0	3	0	0	0	0	0	0	1	0	0	100
	Mean	43.80	42.60	.00	8.20	.00	.00	.00	.00	.00	3.00	2.40	.00	.00	100.00
	StDev	14.20	25.19	.00	16.71	.00	.00	.00	.00	.00	3.00	2.30	.00	.00	.00
Endocladia	525	40	2	0	27	0	0	12	0	0	18	1	0	0	100
	526	39	4	0	28	0	0	11	0	0	18	0	0	0	100
	527	43	1	0	14	0	0	0	0	0	40	2	0	0	100
	528	24	0	1	38	0	0	0	5	0	32	0	0	0	100
	529	26	0	0	40	0	0	0	1	0	33	0	0	0	100
	Mean	34.40	1.40	.20	29.40	.00	.00	4.60	1.20	.00	28.20	.60	.00	.00	100.00
	StDev	8.73	1.67	.45	10.38	.00	.00	6.31	2.17	.00	9.81	.89	.00	.00	.00
Mussels	530	72	0	0	1	0	0	20	0	0	3	4	0	0	100
	531	5	0	0	0	0	0	86	0	0	7	2	0	0	100
	532	0	0	0	0	0	0	16	6	1	51	26	0	0	100
	533	24	1	0	1	0	0	65	0	0	9	0	0	0	100
	534	4	0	0	0	0	0	0	55	0	41	0	0	0	100
	Mean	21.00	.20	.00	.40	.00	.00	37.40	12.20	.20	22.20	6.40	.00	.00	100.00
	StDev	29.98	.45	.00	.55	.00	.00	36.34	24.07	.45	22.12	11.08	.00	.00	.00

**Table B-21 Percent Cover of Index Species
Fossil Reef, Santa Rosa Island - fall 2006 (12/1/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	605	46	50	0	3	0	0	0	0	0	0	1	0	0	100
	606	54	43	0	0	0	0	0	0	0	0	0	3	0	100
	607	31	63	0	6	0	0	0	0	0	0	0	0	0	100
	608	78	22	0	0	0	0	0	0	0	0	0	0	0	100
	609	72	25	0	0	0	0	0	0	0	2	0	1	0	100
	Mean	56.20	40.60	.00	1.80	.00	.00	.00	.00	.00	.40	.20	.80	.00	100.00
	StDev	19.16	17.21	.00	2.68	.00	.00	.00	.00	.00	.89	.45	1.30	.00	.00
Endocladia	610	21	39	0	38	0	0	0	0	0	2	0	0	0	100
	611	4	51	0	41	0	3	0	0	0	0	1	0	0	100
	612	36	59	0	1	0	0	0	0	0	3	1	0	0	100
	613	13	10	0	34	0	43	0	0	0	0	0	0	0	100
	614	44	38	0	8	0	2	0	0	0	5	3	0	0	100
	Mean	23.60	39.40	.00	24.40	.00	9.60	.00	.00	.00	2.00	1.00	.00	.00	100.00
	StDev	16.38	18.61	.00	18.50	.00	18.72	.00	.00	.00	2.12	1.22	.00	.00	.00
Silvetia (Rockweed)	615	26	60	0	12	0	1	0	0	0	1	0	0	0	100
	616	47	17	0	25	0	3	0	0	0	8	0	0	0	100
	617	20	12	0	13	0	53	0	0	0	2	0	0	0	100
	618	13	0	0	10	0	76	0	0	0	0	1	0	0	100
	619	4	0	0	0	0	96	0	0	0	0	0	0	0	100
	Mean	22.00	17.80	.00	12.00	.00	45.80	.00	.00	.00	2.20	.20	.00	.00	100.00
	StDev	16.20	24.74	.00	8.92	.00	42.79	.00	.00	.00	3.35	.45	.00	.00	.00
Mussels	620	5	0	1	0	0	0	2	23	0	44	25	0	0	100
	621	21	7	7	0	0	0	0	3	0	50	12	0	0	100
	622	26	0	5	0	0	0	47	1	0	18	3	0	0	100
	623	26	0	6	0	0	0	49	1	2	10	6	0	0	100
	624	0	0	0	0	0	0	0	56	0	16	28	0	0	100
	Mean	15.60	1.40	3.80	.00	.00	.00	19.60	16.80	.40	27.60	14.80	.00	.00	100.00
	StDev	12.26	3.13	3.11	.00	.00	.00	25.95	23.79	.89	18.08	11.21	.00	.00	.00

**Table B-22 Percent Cover of Index Species
Johnson's Lee, Santa Rosa Island - fall 2006 (12/4/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	500	33	64	0	0	0	0	0	0	0	3	0	0	0	100
	501	38	59	0	0	0	0	0	0	0	0	3	0	0	100
	502	56	43	0	0	0	0	0	0	0	0	1	0	0	100
	503	53	36	0	9	0	0	0	0	0	0	2	0	0	100
	504	100	0	0	0	0	0	0	0	0	0	0	0	0	100
	Mean	56.00	40.40	.00	1.80	.00	.00	.00	.00	.00	.60	1.20	.00	.00	100.00
	StDev	26.45	25.30	.00	4.02	.00	.00	.00	.00	.00	1.34	1.30	.00	.00	.00
Endocladia	505	100	0	0	0	0	0	0	0	0	0	0	0	0	100
	506	79	0	1	18	0	0	1	0	0	0	1	0	0	100
	507	35	0	0	50	0	0	11	0	0	4	0	0	0	100
	508	31	6	0	35	0	0	25	1	0	1	1	0	0	100
	509	65	0	1	31	0	0	2	0	0	1	0	0	0	100
	Mean	62.00	1.20	.40	26.80	.00	.00	7.80	.20	.00	1.20	.40	.00	.00	100.00
	StDev	29.29	2.68	.55	18.83	.00	.00	10.57	.45	.00	1.64	.55	.00	.00	.00
Mussels	510	12	1	0	0	0	0	3	52	0	22	10	0	0	100
	511	18	0	0	0	0	0	0	39	0	35	8	0	0	100
	512	33	0	0	0	0	0	64	0	2	0	1	0	0	100
	513	100	0	0	0	0	0	0	0	0	0	0	0	0	100
	514	100	0	0	0	0	0	0	0	0	0	0	0	0	100
	Mean	52.60	.20	.00	.00	.00	.00	13.40	18.20	.40	11.40	3.80	.00	.00	100.00
	StDev	43.94	.45	.00	.00	.00	.00	28.32	25.34	.89	16.27	4.82	.00	.00	.00

**Table B-23 Percent Cover of Index Species
Northwest-Talcott, Santa Rosa Island - Fall 2006 (12/2/06)**

Zone	Plot	Bare Rock	Acorn Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Chthamalus/Balanus	560	47	52	0	1	0	0	0	0	0	0	0	0	0	100
	561	23	68	0	0	0	9	0	0	0	0	0	0	0	100
	562	8	88	0	0	0	0	0	0	0	4	0	0	0	100
	563	18	10	0	4	0	66	0	0	0	2	0	0	0	100
	564	46	23	0	0	0	6	0	0	0	24	1	0	0	100
	Mean	28.40	48.20	.00	1.00	.00	16.20	.00	.00	.00	6.00	.20	.00	.00	100.00
	StDev	17.39	31.96	.00	1.73	.00	28.11	.00	.00	.00	10.20	.45	.00	.00	.00
Endocladia	555	25	0	0	28	0	46	0	0	0	1	0	0	0	100
	556	53	4	0	30	0	10	0	0	0	2	0	1	0	100
	557	32	1	0	28	0	34	0	4	0	1	0	0	0	100
	558	56	0	0	23	0	2	0	0	0	16	3	0	0	100
	559	62	0	0	3	0	0	0	2	0	30	3	0	0	100
	Mean	45.60	1.00	.00	22.40	.00	18.40	.00	1.20	.00	10.00	1.20	.20	.00	100.00
	StDev	16.13	1.73	.00	11.15	.00	20.51	.00	1.79	.00	12.86	1.64	.45	.00	.00
Silvetia (Rockweed)	565	0	0	0	0	0	98	0	0	0	2	0	0	0	100
	566	17	0	0	0	0	83	0	0	0	0	0	0	0	100
	567	38	0	0	0	0	56	0	0	0	5	1	0	0	100
	568	8	0	0	3	0	89	0	0	0	0	0	0	0	100
	569	62	1	0	14	0	18	0	0	0	5	0	0	0	100
	Mean	25.00	.20	.00	3.40	.00	68.80	.00	.00	.00	2.40	.20	.00	.00	100.00
	StDev	25.08	.45	.00	6.07	.00	32.43	.00	.00	.00	2.51	.45	.00	.00	.00
Mussels	550	27	0	0	0	0	0	24	20	2	26	1	0	0	100
	551	9	0	0	0	0	0	67	7	0	17	0	0	0	100
	552	20	0	0	0	0	0	45	10	9	14	2	0	0	100
	553	23	0	1	0	0	0	30	14	7	23	2	0	0	100
	554	23	0	1	0	0	0	42	4	2	26	2	0	0	100
	Mean	20.40	.00	.40	.00	.00	.00	41.60	11.00	4.00	21.20	1.40	.00	.00	100.00
	StDev	6.84	.00	.55	.00	.00	.00	16.59	6.24	3.81	5.45	.89	.00	.00	.00

Appendix C. Trip Reports

The following are trip reports from the Rocky Intertidal Monitoring 2006 field season (March 2006 through January 2007). Reports were prepared by Dan Richards and Susie Tharratt. The reports summarize the work done during each monitoring event, provide a quick summary of the data collected, include many of the data tables and site-specific graphs, and serve as metadata for the information collected.

Spring 2006 Rocky Intertidal Monitoring Trip Reports

Anacapa Island (ANI) and eastern portion of Santa Cruz Island (SCI), March 25-29, 2006
(Database event #2006-A)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Mike Moss, KFM Biological Technician, Channel Islands National Park (Mar 25, 27- 28)
Dani Lipski, Research Coordinator, CI National Marine Sanctuary (Mar 28)
Matt Churape, VIP (Mar 26 – 29)

PROCEDURE and general observations: We staged all operations daily from the NOAA National Marine Sanctuary vessel, R/V *Shearwater*, for the 5-day survey period. Intertidal sites were accessed by skiff deployed from the vessel. Standard procedures were used for monitoring the rocky intertidal sites. All plots and site overviews were photographed with an Olympus 5050 digital camera mounted on a PVC quadrapod. Scoring was performed in the field for all but the *Hesperophycus* plots at Scorpion Rock (SCI) and the 12 plots at Middle-East on Anacapa. Motile invertebrates were counted in all the photoplots except for *Mytilus* plots at South Frenchy's Cove (ANI) and the 12 plots at Anacapa Middle-East. Sub-sampling of motile invertebrates was performed for littorines and small limpets when in abundance, using three 20x20 cm, or 10x10 cm, subplots where noted. No surfgrass transects were made. Sea stars were counted and measured at all sites using a timed-search method. Abalone were opportunistically enumerated and measured only during sea star searches due to constraints in time and/or personnel. The maximum number of shorebirds and pinnipeds seen at any one time was recorded. On the final day approximately 40 hauled-out harbor seals resulted in abandoning the scheduled visit to Cat Rock (ANI).

25 March 06, Scorpion Rock, SCI. Low tide -0.8 ft. at 1310 hrs. Conditions were mostly cloudy, with a light, misting rain starting at 1330, continuing until we finished. Swell was 1-2 ft. Four western gulls, five black oystercatchers and two American oystercatchers were in the area. Pelicans were on the north side of Scorpion Rock. A group of kayakers paddled the waters surrounding Scorpion Rock but did not come ashore. We were onsite from 1035-1515 hrs.

Hesperophycus plots (Site B) were all photographed but not field-scored. Mike assisted by holding the diffuser screen since the sun was intermittent in both appearance and intensity. Pans from the reference bolt were taken. Dan performed motile invertebrate counts, while Mike and Susie made repairs to plots 813 & 814. A new anchor hole was drilled and a bolt was secured with epoxy at the lower left corner of 813. Epoxy was applied to 814 at its lower left corner. A repair to plot 815 was left unmade.

Charlie Lara (*Shearwater's* First Mate) transported us by skiff to Site A at 1150. Mike again assisted with photoplots, holding diffuser and recording to photo log. Pans were taken from R1, then R2. Susie progressed to field scoring the 20 plots while Mike conducted a 30-minute *Pisaster ochraceus* search. He measured 67 total, with an additional 13 enumerated but unmeasured. Sizes ranged from 69-172 mm radius. Sea stars were large - only 10 measured less than 100 mm.

Tetraclita and *Balanus* were abundant in their occurrence. Large-sized *Mytilus galloprovincialis* were present in M1. Few *Mytilus* were present in M2, replaced mainly by the algae *Chondracanthus* sp. and *Mazzaella affinis*. *Endocladia* was abundant across the site and *Hesperophycus* appeared robust and healthy. Purple urchins were common.

Littorina sp. were numerous in areas, particularly on rock above the barnacle plots. *Pollicipes* colonies were present in several *Endocladia* plots. *Pisaster ochraceus* occurred in three mussel plots. *Septifer* were also common. Other small bivalves were noted in the mussel beds as were numerous nemerteans. A high level of recruitment was noted for *Littorina* sp., *Egretta menziesii*, and *Pollicipes polymerus*.

Dan measured motiles in all plots and found them to be common in nearly all plots. Other than littorinids, *Nucella* spp. and *Ocenebra* spp. appeared most abundant, with some *Acanthina* spp. present. Dan believed some *Ocenebra* sp. may be *O. interfosa*.

Prior to our day's sampling, we dropped Harry Carter, Mitch Dennis and Kara Randall off at the Bat Cave (SCI) to check for skunk presence and/or evidence of bird predation by skunks. Seas and swell were too rough for multiple landings, so Annie Little, Jen Boyce, and Bill McIver accompanied Josh Adams and Jim Lovvern to Scorpion Rock to check on status of auklet nest boxes. Some scratches were evident outside nest boxes, but no nesting had begun.

Following their recognizance of Scorpion Rock, the *Shearwater* departed to retrieve the landing party at Bat Cave (while we continued sampling). Evidently, this proved eventful. Wet exit was required by the party, suggesting that in future visits wetsuits might be prudent, if not necessary. When swell is up, access to the cave is best attempted at high tide due to the restricted landing access. This is contrary to the general need for low tides to complete rocky intertidal monitoring.

Four skunk traps were left baited in and around the cave entrance. These traps will be recovered later in the week.

Photoplot Summary - mean percent cover by zone at Scorpion Rock, SCI, Spring 2006. (5 plots/zone):

Zone Name	Bare Rock	Barnacle	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hesperophycus</i>	<i>Silvetia</i>	Mussel
Barnacle	23.0	27.8	0.2	45.8	0.0	0.0	1.2
Endocladia	11.2	3.6	0.0	61.0	0.0	0.0	3.8
Mussel	8.0	0.2	28.8	2.2	0.0	0.0	24.0
<i>Tetraclita</i>	49.0	1.0	19.0	9.4	2.2	0.0	3.6
<i>Hesperophycus</i>	26.2	3.4	0.0	18.2	29.6	11.2	0.2

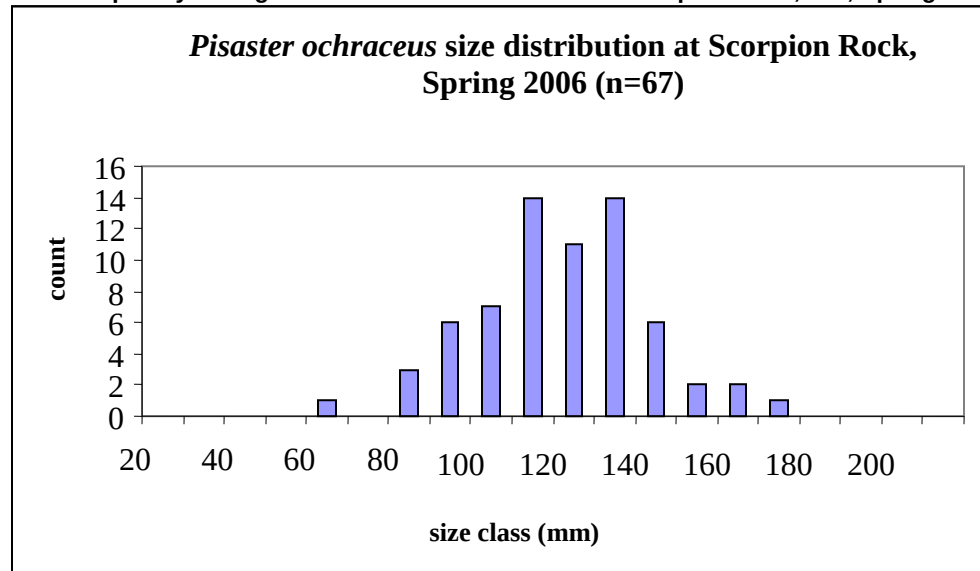
**Photoplot Summary - mean percent cover by zone at Scorpion Rock, SCI, Spring 2006. (5 plots/zone)
(continued):**

Zone Name	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other
Barnacle	0.0	0.2	0.8	1.0	0.0	0.0
Endocladia	1.4	2.8	16.2	0.0	0.0	0.0
Mussel	17.4	3.6	14.6	1.2	0.0	0.0
Tetraclita	0.6	0.2	13.2	1.8	0.0	0.0
Hesperophycus (Rockweed)	0.2	0.2	10.2	0.6	0.0	0.0

***Pisaster ochraceus* counts and min/max/mean sizes for Scorpion Rock, SCI, Spring 2006:**

Total Count	80
Total Measured	67
Minimum size (mm)	69
Maximum size (mm)	172
Mean size (mm)	122

Size Frequency Histogram for *Pisaster ochraceus* for Scorpion Rock, SCI, Spring 2006:



Motile invertebrate count totals at Scorpion Rock, SCI, Spring 2006:

Zone plot #	Barnacle					Endocladia					Hesperophycus				
	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815
<i>Lepidochitona</i> spp.							1						5		4
<i>Nuttallina</i> spp.							1		1						1
<i>Fissurella volcano</i>			1												
<i>Pachygrapsus crassipes</i>						1	1								4
<i>Pagurus</i> spp.								1	1						
large limpets (>10 mm)										1			4		7
<i>S. purpuratus</i>						1									
<i>Amphissa versicolor</i>															
<i>Nucella emarginata</i>	1					6	15	10	2	2		1			
<i>Acanthina</i> spp.					1			1	2	1	1	2			5
<i>Tegula funebris</i>															3
<i>Tegula gallina</i>															
<i>Ceratostoma nuttalli</i>															
<i>Ocenebra circumtexta</i>						2	3	3	7	5					
<i>Lottia gigantea</i>															
<i>Pisaster ochraceus</i>															
<i>Epitonium</i> spp.															
<i>Littorina</i> spp.															
Limpet (< 5 mm)															
Limpet 5-15 mm															

Motile invertebrate count totals at Scorpion Rock, SCI, Spring 2006 (continued):

Zone plot #	Mussel					Tetraclita					TOTALS
	816	817	818	819	820	821	822	823	824	825	
<i>Lepidochitona</i> spp.	1	1	2		2						16
<i>Nuttallina</i> spp.	17		26	30	21						97
<i>Fissurella volcano</i>		3	1	5	5						15
<i>Pachygrapsus crassipes</i>	3	3	1	1	1						15
<i>Pagurus</i> spp.											2
large limpets (>10 mm)			1		1						14
<i>S. purpuratus</i>	1		2	14	1						19
<i>Amphissa versicolor</i>		2	2								4
<i>Nucella emarginata</i>	3		6								46
<i>Acanthina</i> spp.	2										15
<i>Tegula funebris</i>											3
<i>Tegula gallina</i>											0
<i>Ceratostoma nuttalli</i>	3	3									6
<i>Ocenebra circumtexta</i>	26	15	17	15	11						104
<i>Lottia gigantea</i>											0
<i>Pisaster ochraceus</i>		2									2
<i>Epitonium</i> spp.											0
<i>Littorina</i> spp.											6397
Limpet (< 5 mm)											226
Limpet 5-15 mm											2064

26 March 06, Middle-East and Middle-West, ANI. Low tide -0.9 ft. at 1346 hrs. Conditions were mostly sunny and very workable, though we were too warm much of the afternoon. The wind was light and the swell was moderate. There were two harbor seals offshore and five black oystercatchers and 4 western gulls around the site. Approximately 20 brown pelicans were on the shoreline rocks. The ones on the rocks moved up slope when we arrived and the rest did not pay much attention to us. We were on site from about 0950 to 1600 hrs.

It took approximately one hour to survey Middle-East. The tide was still a little high when we landed. Photoplots were photographed, with Matt holding diffuser. Pans were taken, although a fogged housing lens went undetected until pictures were downloaded back at the office that night. Only pans were adversely affected; photos of photoplots were sharp and readable. Dan counted motile invertebrates.

The alga we suspect is *Caulacanthus* (still no confirmation) is still present on mussels in a small patch in plot 53 but is browner in color and less obvious that it was last fall. Plots at Middle-East were not field-scored.

Although there has been enough erosion that a crossing between ME & MW is possible, it was too risky at this time. Harry Carter, operating the skiff, transported us across the surge channel to the west area. We moved to Middle-West at 1050. Harry, Josh Adams and Josh Koeptke checked on murrelet nests around Anacapa while we worked. None were found yet, but they were unable to access all their sites.

Susie and Matt photographed all photoplots while Dan counted motile invertebrates. Susie then field scored all plots while Matt assisted Dan with motiles. Motile invertebrates were moderately abundant. *Nucella emarginata*, *Ocenebra* sp., *Acanthina* sp. and *Ceratostoma* were in plots together. There were not many limpets in some plots while *Littorina* spp. were moderate in plots mostly.

Three kayakers paddled by during the survey. Dan removed the temperature logger and housing from Middle-West at 1215. It was downloaded back in the office at 1730.

Mussel cover ranged from 66 to 99 % cover in the *Mytilus* plots, remaining consistent overall compared with percent cover estimates from spring, 2004. A modest 5% increase in mussel cover was calculated between '04 and '05.

Photoplot Summary - mean percent cover by zone at Middle-East, ANI, Spring 2006 (3 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussel
Barnacle	50.3	10.3	8.7	14.3	0.0	0.0	5.0
Endocladia	25.7	13.0	6.3	22.0	2.3	7.7	6.7
Rockweed	6.7	1.3	2.0	4.7	0.0	47.0	15.3
Mussel	1.7	1.7	0.3	0.0	0.0	0.3	87.3

Zone	Turfweed	Leaf Barn.	Misc Algae	Misc Anim.	Tar	Other
Barnacle	0.0	0.0	7.0	0.0	4.3	0.3
Endocladia	0.0	0.0	15.3	0.0	0.0	1.0
Rockweed	4.0	0.0	18.3	0.3	0.0	0.3
Mussel	0.0	0.0	8.7	0.0	0.0	0.0

Photoplot Summary - mean percent cover by zone at Middle-West, ANI, Spring 2006 (5 plots/zone):

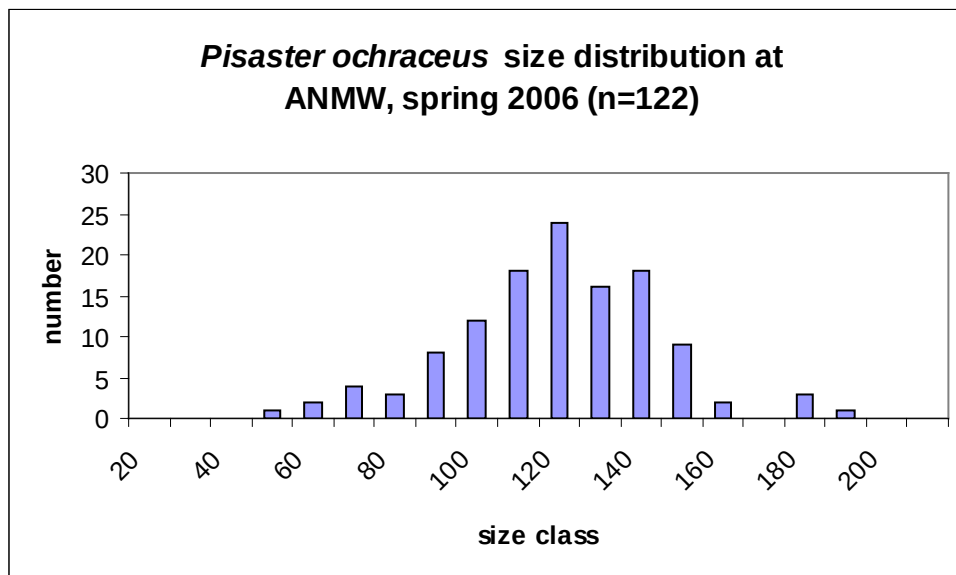
Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussel
Barnacle	29.6	27.2	0.2	19.0	0.0	0.0	2.0
Endocladia	30.6	12.2	0.8	23.4	0.0	0.0	19.2
Rockweed	29.2	2.2	1.4	5.0	0.0	39.8	3.6
Mussel	9.4	0.8	0.2	1.0	0.0	0.0	82.6

Zone	Turfweed	Leaf Barn.	Misc Algae	Misc Anim.	Tar
Barnacle	0.2	0.2	20.6	1.0	0.0
Endocladia	0.0	0.2	12.4	1.2	0.0
Rockweed	1.6	0.2	16.6	0.4	0.0
Mussel	0.0	0.0	5.6	0.4	0.0

***Pisaster ochraceus* counts and min/max/mean sizes for Middle-West, ANI, Spring 2006:**

Total Count	122
Total Measured	122
Minimum size (mm)	50
Maximum size (mm)	190
Mean size (mm)	121

Size Frequency Histogram for *Pisaster ochraceus* for Middle-West, ANI, Spring 2006:



Note: No sea star search conducted at Middle-East, ANI in Spring 2006.

Refer to Appendix D in annual report for motile invertebrate count and size frequency data at Middle West, Anacapa Island Spring 2006.

27 March 09, Orizaba Cove, SCI. Low tide -0.8 ft. at 1420 hrs. Weather conditions were mostly cloudy, with a cool east breeze at times, though in general a very nice day. A new rockfall on west side of cove was observed. We were onsite from 0950-1530 hrs.

R/V *Shearwater* departed Ventura Harbor at 0800, and dropped us off first at Orizaba Cove, before proceeding with Josh Adams and Jim Lovvern to Prince Island (SMI). Charlie ferried us ashore by skiff, and as the tide was still too high, we went on a brief hike to the next cove. Upon return, Mike shot photoplots with Matt's assistance while Susie commenced with field scoring and Dan, with motile counts. A gust of wind blew Susie's clipboard into the water just below the M1 and M2 plots, resulting in the need to rescore approximately 7 plots. Due to confusion with plot numbers and other questions the photos were re-scored in the office at a later date and those data are presented below.

The site looked good, with lush-looking *Endocladia* and *Hesperophycus* looking robust and healthy. Both were common in abundance. *Silvetia compressa* was observed to be coming in well on the point. Barnacles were large in size and appeared to be doing well. *Mytilus* was very dense and deep. Some big open gaps at the base of the reef were seen where *Pisaster* appeared to be working into the mussel bed. *Mytilus* appeared to have had good recruitment and some very dense *Pollicipes* patches are appearing. The vermetid gastropod, *Petalochonchus*, was observed again this year at Orizaba.

We were finishing up just as the *Shearwater* returned at about 1500. Dan donned on his wetsuit to retrieve (in about 15 feet of water) the submerged clipboard blown from the ledge earlier in the day. One photoplot scoring sheet was not recovered, although the data had already been recollected. Dan remained in gear as we motored to the Bat Cave to attempt retrieval of skunk traps. No signs of activity were seen; Dan found 2 traps and left 2.

Photoplot Summary - Mean Percent Cover by Zone at Orizaba Cove, SCI, Spring 2006 (5 plots/zone)

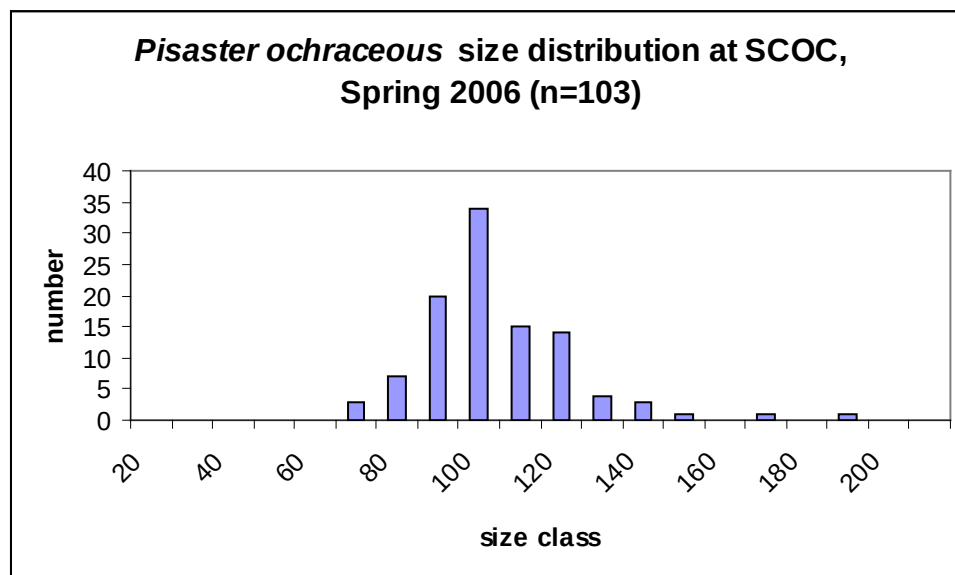
Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussel
Barnacle	22.6	66.0	2.0	0.0	0.0	0.0	3.4
Silvetia (Rockweed)	9.6	0.0	3.4	23.4	18.0	21.0	4.8
Mussels	2.8	0.2	5.2	0.0	0.0	0.0	83.0
Tetraclita	11.4	0.0	26.2	3.8	0.0	0.4	47.8
Hesperophycus (Rockweed)	5.0	17.0	0.4	37.6	20.2	2.4	7.6

Zone	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Barnacle	0.0	0.0	6.0	0.0	0.0
Silvetia (Rockweed)	0.0	0.0	19.8	0.0	0.0
Mussels	0.0	1.8	5.8	1.2	0.0
Tetraclita	0.2	0.2	9.2	0.8	0.0
Hesperophycus (Rockweed)	0.0	0.0	9.8	0.0	0.0

***Pisaster ochraceus* counts and min/max/mean sizes at Orizaba Cove, SCI, Spring 2006:**

Total Count	105
Total Measured	103
Minimum size (mm)	70
Maximum size (mm)	198
Mean size (mm)	109

Size Frequency Histogram for *Pisaster ochraceus* at Orizaba Cove, SCI, Spring 2006:



Refer to Appendix D in annual report for motile invertebrate count and size frequency data at Orizaba Cove, SCI, Spring 2006.

28 March 06, South Frenchy's Cove, ANI. Low tide -0.5 ft. at 1453 hrs. It rained fairly constantly throughout the day, with heavy rain intermittent. Wind was from the east, causing significant splash and some periods of wash. Five black oystercatchers were present and one American oystercatcher was observed on north side. There were two dead western gulls (likely 'peregrine kills') and one dead brown pelican fledgling on north Frenchy's. Some fresh tar balls were observed floating around and even small tar spots were seen in some plots. Small rockfalls from the cliffs occurred frequently throughout the day due to heavy rains. Sand level at plot 155 was 45 cm below the corner marker. We were on site from 1130-1500 hrs.

R/V *Shearwater* dropped off a group of 16+ *The Nature Conservancy* folks at Prisoner's Harbor first, and then we beat back to Anacapa in east wind to look at Cat Rock. It was too rough to land there, so we opted to sample South Frenchy's in spite of driving rain when we arrived.

Mike and Dani shot photoplots and then scored *Endocladia* plots. Susie scored remaining plots. When tide was near low, Dan and Susie photographed and scored mussel plots. Periodic waves were soaking plots so Dan did not count motiles in the *Mytilus* plots. All other plots were surveyed for motile invertebrates. Matt served as data recorder. Not many motiles were observed, with low numbers of littorines and small limpets. Snails were either cryptic or had emigrated to other areas. Mike and Dani measured owl limpets in the three *Lottia* circular plots. Rockweed and *Endocladia* looked great. *Chthamalus* was nearly a solid block in some plots.

Susie began a 30-minute sea star search, finding a total of four *Pisaster ochraceus*, one of which could not be reached due to heavy surf. Approximately 15 minutes into the search, Dan decided it was time to depart, as sea-state and tidal conditions were worsening.

It was noted that plot 264 missing 3 corners and 266 missing all corners, though no repairs were made.

Photoplot Summary - Mean Percent Cover by Zone (5 plots/zone) at South Frenchy's Cove, ANI, Spring 2006:

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussel
Barnacle	29.6	27.2	0.2	19.0	0.0	0.0	2.0
Endocladia	30.6	12.2	0.8	23.4	0.0	0.0	19.2
Rockweed	29.2	2.2	1.4	5.0	0.0	39.8	3.6
Mussel	9.4	0.8	0.2	1.0	0.0	0.0	82.6

Zone	Turfweed	Leaf Barn.	Misc Algae	Misc Anim.	Tar	Other
Barnacle	0.2	0.2	20.6	1.0	0.0	0.0
Endocladia	0.0	0.2	12.4	1.2	0.0	0.0
Rockweed	1.6	0.2	16.6	0.4	0.0	0.0
Mussel	0.0	0.0	5.6	0.4	0.0	0.0

***Pisaster ochraceus* counts and min/max/mean sizes at South Frenchy's Cove, ANI, Spring 2006:**

Total Count _a	105
Total Measured _b	103
Minimum size (mm)	70
Maximum size (mm)	111
Mean size (mm)	109

Note _a: Time search reduced to ~15 minutes because of adverse weather

Note _b: No size frequency distribution was generated due to the small sample size

Refer to Appendix D in annual report for motile invertebrate count and size frequency data at South Frenchy's Cove, ANI, Spring 2006:

Selected Motile Invertebrate Size Frequencies, South Frenchy's Cove, ANI, Spring 2006:

	<i>Nucella emarginata</i>	<i>Acanthina</i> spp.	<i>Tegula funebris</i>	<i>Ceratostoma nuttalli</i>	<i>Ocenebra circumtexta</i>	<i>Lottia gigantea</i>
COUNT	1	4	1	0	0	1
Average size	-	15	-	0	0	-
Min size (mm)	15	13	28	0	0	49
Max size (mm)	15	17	28	0	0	49

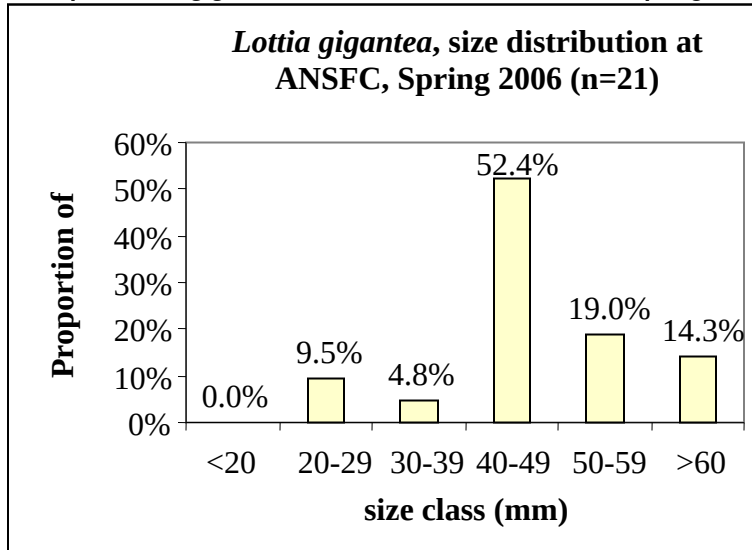
Summary Statistics for Plot Censuses of Owl Limpets, *Lottia gigantea*, at SFC, ANI, Spring 2006:

Plot #	Count Density	Area	Density	Count Sized	Mean Size	Std Dev	Min Size	Max Size
1	6	3.14	1.910	6	40.17	15.11	20	56
2	9	3.14	2.547	8	43.25	4.40	39	53
3	6	3.14	1.910	6	54.17	8.52	42	61

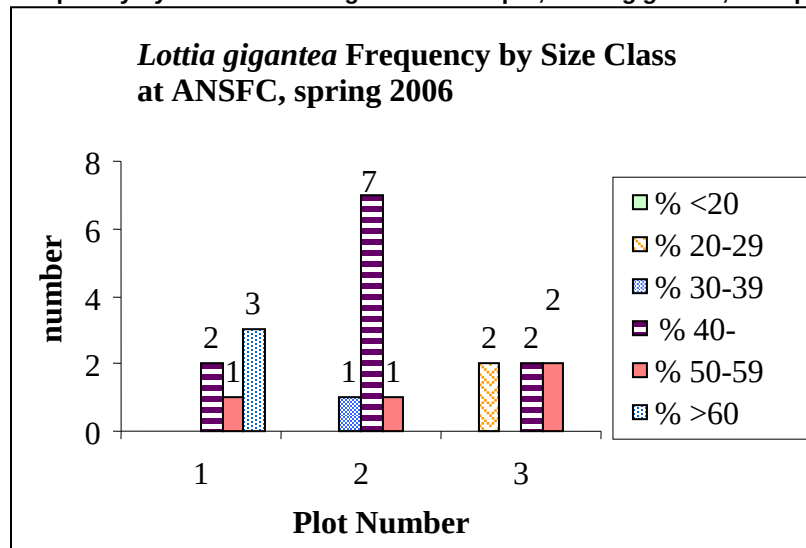
Owl Limpet, *Lottia gigantea*, Size Distribution Within Plots at SFC, ANI, Spring 2006:

Plot #	% less than 20 mm	% 20-29mm	% 30-39mm	% 40-49mm	% 50-59mm	% greater than 60mm
1	0	0	0	2	1	3
2	0	0	1	7	1	0
3	0	2	0	2	2	0

Owl Limpet, *Lottia gigantea*, size distribution for ANSFC, Spring 2006:



Frequency by Size Class Range of Owl Limpet, *Lottia gigantea*, for 3 plots at ANSFC, Spring 2006:



29 March 06, Cat Rock, ANI. Low tide -0.1 at 1525. R/V *Shearwater* departed Ventura at 0900. Conditions were fair, with mostly sun and light winds by the time we reached Anacapa Island. Swell was moderate.

The monitoring reef was completely awash at Cat Rock at 1000. Kate Pete and Charlie Lara made a scuba-assisted dive near South Frenchy's Cove to place a hydrophone out to collect ambient sound recordings for the Sanctuary as we waited out the tide.

We returned off Cat Rock at about 1200. The reef although exposed now was still being washed by occasional swells and only the inner reef would have been workable. However, there were at least 25 harbor seals on the beach west of the site where we would have had to land. An additional 16-18 were on the beach on the east side of the site. Several pups were with them. All of these seals would have "flushed" if we went ashore, at the same time it was still questionable whether we could have worked all plots. Monitoring was therefore abandoned at this time. Island Packers (IPCO) had landed a few folks at Frenchy's Cove but it didn't appear to be many.

We took the opportunity to return to Bat Cave so Dan could retrieve the last two remaining skunk traps. Some rain was falling on eastern Santa Cruz Island in the afternoon. We returned to Ventura Harbor at about 1530.

Fall 2006 Rocky Intertidal Monitoring Trip Reports

Santa Barbara Island November 1-8, 2006

(Database event #2006-B)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Anna Braswell, SCA Intern, CINP
Haven Livingston, UCSC/PISCO
Rani Gaddam, UCSC/PISCO
Kyle Walters, UCSC/PISCO

PROCEDURE and general observations: We were transported to the island on the *Sea Ranger II* November 1st, with glassy conditions the entire way out. We arrived at approximately noon time; the low tide was occurring then so we spent that day getting oriented, transporting gear to the bunkhouse and getting settled. This was a week-long tour, with the low tides series improving later in the week. Sarah Chaney was also along to monitor *Dudleya traskii* populations and to map pelican nesting areas. Standard procedures were used for monitoring the rocky intertidal sites. All plots and site overviews were photographed with an Olympus 5050 digital camera mounted on a PVC quadrapod. Scoring was performed in the field for all plots. Motile invertebrates were counted in all the photoplots. Sub-sampling of motile invertebrates was performed for littorines and small limpets when in abundance, using three 20x20 cm, or 10x10 cm, subplots where noted. Sea stars were counted and measured at all sites using a timed-search method. Abalone were enumerated and measured during 30-minute searches. The maximum number of shorebirds and pinnipeds seen at any one time was recorded.

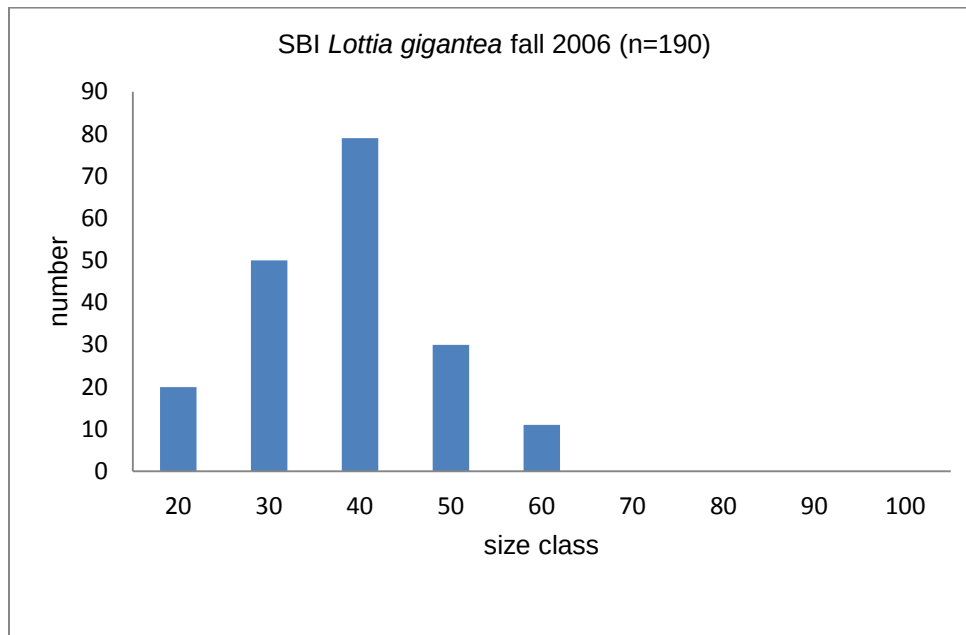
November 2, Landing Cove: Low tide +0.5 ft. at 1253hrs. Partly cloudy and calm wind, but with moderate swell. One black oystercatcher and one black turnstone were observed at the site. We spent some time initially going over procedures and locating and cleaning plots at both sections of Landing Cove, then we counted motile invertebrates and scored percent cover in the *Silvetia* zone and barnacle zone plots. We had to quit motile invertebrate counts before completing all the barnacle plots because of waves and incoming tide. We were onsite from 1030-1500 hrs.

November 3, Landing Cove: Low tide -0.3 ft. at 1339 hrs. Moderate swell made it difficult to work all lower plots entirely. There were five black oystercatchers, three black turnstones, and one wandering tattler. We were able to complete all plot photos and plot scoring in the field. We did not complete motile invertebrate counts knowing we had time and more favorable tides later in the week. I did a general species list for about 20 minutes while waiting for the tide to drop. We were on site from 1100-1530 hrs.

November 4, Sea Lion Rookery: Low tide -0.8 ft. at 1425 hrs. We had very good conditions and we were able to shoot all the photos, score the plots, and count motile invertebrates in all plots. Also did a search and measurements of seastars and abalone. Onsite from 1130-1700 hrs.

November 5, Sea Lion Rookery: Low tide -1.1 ft. at 1511 hrs. Water temperature 16°C. Excellent weather conditions again. There were two black oystercatchers and five black turnstones present. We were onsite from 1200-1630 hrs.

We searched the sea lion colony, to collect tissue samples from dead pups for genetic analysis by the Marine Mammal Center in a continuation of the project started in 2005. We collected tissue from six carcasses. The UCSC crew finished the biodiversity transects. We measured owl limpets for thirty minutes for a size distribution of the site. We pumped water out of a tidepool to facilitate capture of fish and spent time trying to identify them. Photos were taken of plot locations with frames around them to facilitate finding plots in the future. We replaced epoxy corners at several plots adding epoxy numbers where the brass tags were no longer readable.



Owl limpets size distribution at Sea Lion Rookery, Fall 2006

November 6, Landing Cove: Low tide -1.1 ft. at 1559 hrs. Two black oystercatchers and 2 black turnstones were in the area. We finished the motile invertebrate counts in the last three mussel zone plots and counted and measured seastars and abalone. Two black abalone were found (58 and 65mm). We were onsite from 1500-1700 hrs.

November 7, miscellaneous work day: Low tide -0.9 ft. at 1650 hrs. as we collected additional sea lion tissue samples from around Webster Point. I hauled unused fencing from project site near coreopsis to landing. Shot vegetation photopoints of the island.

November 8, transport day.

Landing Cove Summary: The maximum shorebird count was five black oystercatchers, 2 black turnstones and one wandering tattler all on 11/3/06. Approximately 50 juvenile California sea

lions were present in the cove most days, and spent alternating time between resting on the rocks and playing in the cove.

All photo plots were located with at least two corner bolts except plot 326. A metal detector was marginally useful giving a beep over missing corners, but even though a bolt was detected in plot 326, we could not find it in the dense cover of *Mytilus californianus*. The plot was located approximately, based on recollection of micro-topography and the metal detector signal.

Photoplot summary – mean % cover by zone at Landing Cove, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	24.2	10.8	11.0	2.2	0.0	0.0	11.0
Silvetia (Rockweed)	15.6	0.4	0.0	0.0	0.0	4.8	0.8
Mytilus	0.2	0.0	1.8	0.0	0.0	0.0	93.8
Red Algal Turf	0.2	0.0	0.0	0.0	0.0	0.0	7.8

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Other
Barnacle	17.6	0.2	22.2	0.8	0.0
Silvetia (Rockweed)	16.2	0.2	61.8	0.2	0.0
Mytilus	0.0	0.8	1.8	1.6	0.0
Red Algal Turf	47.2	0.0	11.0	0.6	33.2

Mussel plots generally had over 95% cover of *Mytilus californianus*, with plot 329 being the exception with only 78% *Mytilus* cover. The upper part of the plot was void of mussels and *Tetraclita rubescens* and small *Phragmatopoma californica* dominated there. Motile invertebrates in those plots included numerous *Ocenebra circumtexta*, limpets and in plot 329, *Nuttallina* sp. *Fissurella volcano*, *Lepidochitona* sp. *Amphissa versicolor* and *Strongylocentrotus purpuratus* were also found. The dense cover of mussels doubtlessly prevented finding all the motile invertebrates in these plots.

Red algal turf plots were dominated by *Chondracanthus canaliculatus* and *Gelidium* spp. / *Pterocladia* sp. or *Phyllospadix torreyi* (plots 322 and 323). Very few motile invertebrates were found in these plots. Motile counts were not made in plot 324 because of the surge. No invertebrates were noticed in the plot and historic counts have always been low in this plot.

Silvetia compressa was present in four of the plots in that zone though cover was low. *S. compressa* appeared much more common than in past years. *Mazzaella affinis* and *Ulva* sp. were the dominant organisms in the plots. Bare rock occupied only 21% or less in each of the plots. *Acanthina* sp. were present in each of the plots and sizes were small. Other invertebrates found in small numbers were *Lepidochitona* sp. *Nuttallina* sp. *Pachygrapsus crassipes*, *Pagurus* spp. Limpets, *Epitonium tinctorum*, and a flatworm.

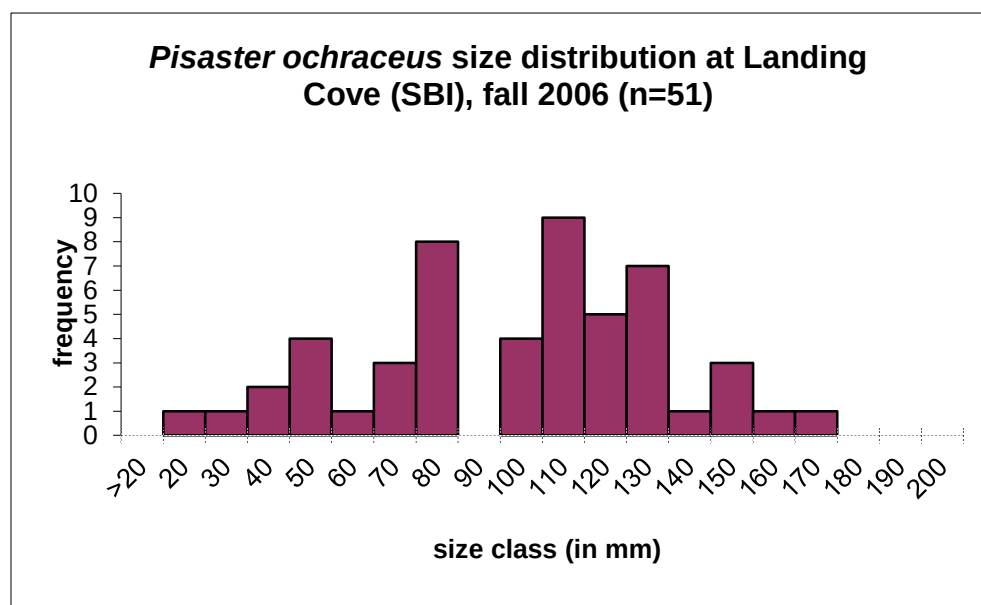
Barnacle plots showed a great deal of variability with *Balanus/Chthamalus* dominating plot 315, *Ulva* sp. and *Gelidium/Pterocladia* dominating 316, 317, and 319, *Mytilus californianus* and

Tetraclita rubescens occupying most of the space in plot 318. Bare rock was common in all the plots. *Littorina* spp. and small limpets were common in all the barnacle plots and small *Ocenebra* spp. were present in all but 319 with 18 and 19 found in two of the plots.

Two black abalone were found (58, 65 mm). A small fresh black abalone shell near the Landing Cove during a dive a week ago. A total of 33 *Pisaster ochraceus* were found in a 30 minute search of the east reef. An additional seven (7) more were found after the count: four small (<40mm) and six medium (75-150mm). *Pisaster ochraceus* were in the 18x 2m transect between plots 327 and 329. Those with bright orange color were noted and 13 of the 33 were orange. The size ranged from 20-170mm radius. A juvenile zebra perch was observed in a tidepool as well as cottids, and a *Gibbonsia* sp.

***Pisaster ochraceus* counts and size frequency histogram at Landing Cove Fall 2006:**

Total Count	61
min	20 mm
max	170 mm
mean	94 mm
stdv	38 mm



Sea Lion Rookery Summary: The maximum number of shore birds seen was on 11/4 with five black turnstones and three black oystercatchers. There were also about 20-30 western gulls on the site each day. California sea lions were present at all times with 100-200 present on the lower rocks when we arrived at the site.

Photoplot summary – mean % cover by zone at Sea Lion Rookery, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	47.4	13.4	1.0	1.6	0.0	0.0	1.0
Endocladia	20.4	2.8	7.4	6.8	0.0	0.2	3.4
Silvetia (Rockweed)	16.6	0.6	3.6	0.8	0.0	37.4	8.6
Mytilus	0.0	0.0	0.0	0.0	0.0	0.0	98.2

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal
Barnacle	0.6	0.0	35.0	0.0
Endocladia	0.2	0.6	57.6	0.6
Silvetia (Rockweed)	8.8	0.0	22.2	1.4
Mytilus	0.0	1.2	0.6	0.0

Most of the upper zone plots had high cover of short (<2cm) *Ulva* sp. *Endocladia muricata* was present in low abundance and all plants were very small though dark in color. *Mazzaella affinis* was common in some plots where sea lions did not traverse such as vertical rocks. Plot 337 (Endocladia zone) is on a vertical wall and had higher cover of *Mytilus* and *Mazzaella* and lower cover of *Ulva* than the other plots in the zone. Small *Mytilus* were present in several of the high zone plots, typically tucked into crevices where their shells created a very uniform surface resistant to crushing or drag.

Barnacle zone plots had relatively low cover of *Balanus/Chthamalus* (7-21% cover) and all plots had high cover of *Ulva* (18-67%) and abundant bare rock. Few limpets were present and *Littorina* spp. were the only snails found in the plots in this zone. Six (6) kelp crabs, *Pugetia producta*, were found in a tidepool in plot 349.

The Endocladia zone plots were dominated by *Ulva* sp. (29-79% cover) but had more diversity and less bare rock exposed than the barnacle plots. *Endocladia muricata* was present in all the plots at low cover (2-15%). Barnacles (*Balanus/Chthamalus* and *Tetraclita*) and *Mazzaella affinis* (1-33%) were present in all plots. A few larger limpets (*Lottia scabra* and one *L. gigantea*) were found. Low numbers of chitons and a *Pachygrapsus crassipes* and several *Ocenebra circumtexta* were found in two plots.

Silvetia compressa was common (30-59% cover) in four of the plots. The plants had good color but the fronds all seemed very thin. Plot 330 is on a boulder lower on the reef and was dominated by *Mytilus californianus* and *Tetraclita rubescens*. *Mazzaella affinis* (2-14%) and *Ulva* sp. (1-26%) were present in all the plots. Motile invertebrates were most common in the Silvetia zone plots, especially hermit crabs (*Pagurus* spp.), chitons, *Ocenebra circumtexta* and *Lottia gigantea*.

Mytilus californianus formed a nearly solid cover throughout the entire Mussel zone area. We had problems finding all the corner markers and did not find any for plots 350 and 351, but I am confident we were in the proper approximate location based on the micro-topography of the area. Only plot 354 did not have 100% cover of *Mytilus*. *Pollicipes polymerus* were present

throughout the area but only had hits in plot 354. Because of the dense cover of mussels it was difficult to find motile invertebrates which we suspect were present with in the interstices of the thick mussel layer. Nevertheless, volcano limpets, *Fissurella volcano*, and *Ocenebra circumtexta* were found in most of the plots. Small limpets were common on the mussel shells. *Tetraclita rubescens* were common but usually were growing on the mussel shells and so were not scored.

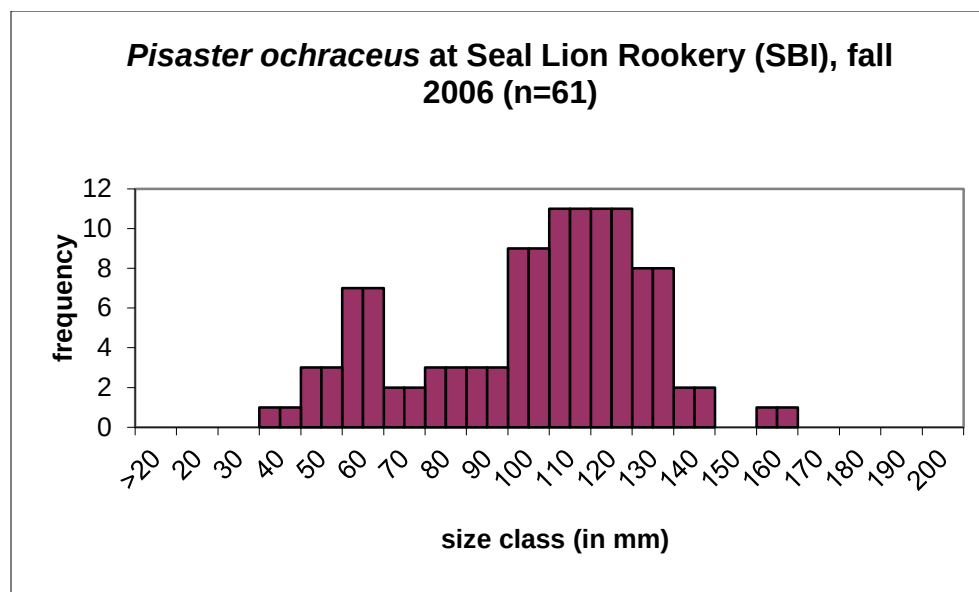
The edges of the surge channels were lined with *Egregia menziesii* and *Halidrys dioica*. *Sargassum muticum* was common in pools on the reef flat and looked unusual with dense clusters of floats at the tip. *Anthopleura* spp. seemed to be very abundant and appeared to have had fairly high recruitment in recent years. Many of the small anemones were growing on mussel shells.

We measured *Lottia gigantea* for 40-minutes in a random search mostly on the reef below plots 338. A total of 189 owl limpets were measured with a size range from 15 to 60 mm. These were mostly found among *Mytilus californianus* on raised rocks on the edge of the reef flat.

A total of 61 *Pisaster ochraceus* were found in a 30-minute search with radius sizes ranging from 40-155 mm. No abalone were found in the 20-minute search, however the next day one black abalone (approximately 60mm) was found among a group of mussels on the reef flat in a Biodiversity Survey transect.

Sea star (*Pisaster ochraceus*) counts and size frequency histogram at Sea Lion Rookery, Fall 2006:

<i>TOTAL</i>	
count	39
min	40 mm
max	155 mm
mean	99 mm
stdv	27 mm



We used a hand pump to drain a small tidepool to search for fish. We found 13 sculpin (Cottidae) and three kelpfish (Clinidae) which were probably *Gibbonsia montereyensis*. The kelp fish were all approximately 70mm, and the sculpins ranged from 60-92mm.

Anacapa Island November 20-22, 2006

(Database event #2006-C)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, Biological Technician, Channel Islands National Park
Anna Braswell, Student Conservation Association Intern at CINP
Ali Griffiths, Student Conservation Association Intern at CINP

PROCEDURE and general observations: We staged all operations daily from the NOAA National Marine Sanctuary vessel, R/V *Shearwater*. Intertidal sites were accessed by skiff deployed from the vessel. Standard procedures were used for monitoring the rocky intertidal sites. All plots and site overviews were photographed with an Olympus 5050 digital camera mounted on a PVC quadrapod. Scoring was performed in the field for all plots except the 12 plots at Middle-East. Motile invertebrates were counted in all the photoplots except for 7 plots at Cat Rock and the 12 plots at Anacapa Middle-East. Sub-sampling of motile invertebrates was performed for littorines and small limpets when in abundance, using three 20x20 cm, or 10x10 cm, subplots where noted. Sea stars were counted and measured at all sites using a timed-search method. Abalone were opportunistically enumerated and measured only during sea star searches due to constraints in time and/or personnel. The maximum number of shorebirds and pinnipeds seen at any one time was recorded.

20 November 2006, Cat Rock: Low tide -0.3 ft. at 1533 hrs. Water temperature was 18°C. Conditions were excellent. The wind and seas were calm. We were uncomfortably hot most of the afternoon. Five black oystercatchers and one rock wren were in the area. One harbor seal watched us from the water. We were onsite from 1115-1645 hrs.

Sarah Chaney and three went up to Summit Canyon to look for cape ivy reported from this fall. Frank Gress was flying pelican surveys in the DFG plane and he reported no nesting activity and little roosting at the time. Connie Jenkins, from the Artists in the Park Program, came along to explore and collect intertidal images for her work.

Susie counted motile invertebrates and I scored photoplots, starting on the highest barnacle plots and working the outgoing tide. After scoring, I shot photos, and then measured owl limpets in plots. Because of limited time, 13 motile plots were not counted. (Six of the 13 were sampled on a revisit on Nov 22 by DVR). The seastar search was also delayed until 22 November. Overview panoramas were shot from L1 and OT2 reference bolts. No repairs were made to corners. Most were in good shape but new numbers are needed in plots 33, 36, and 37.

Three abalone were found in crevices near plot 55. Two were measured (78 and 134mm), the third was out of reach, but was approximated at 130 mm. *Ligia occidentalis* were common among the high rocks. *Pachygrapsus crassipes* were common among the plots.

Photoplot summary – mean % cover by zone at Cat Rock, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	12.2	54.4	0.0	10.8	19.3	1.2	0.0
Endocladia	9.8	7.3	9.6	35.3	0.2	3.2	6.6
Silvetia (Rockweed)	13.2	18.3	1.0	13.1	7.1	39.8	1.4
Mytilus	8.0	3.2	13.2	3.3	0.0	0.0	51.1

Zone	Turfweed	Misc. Algae	Misc. Animal	Other
Barnacle	0.0	1.4	0.6	0.0
Endocladia	10.3	15.6	2.1	0.0
Silvetia (Rockweed)	1.3	4.2	0.4	0.0
Mytilus	2.8	16.0	2.2	0.1

Endocladia muricata was common overall, though cover within the *Endocladia* zone ranged from 7 to 75% with no obvious pattern relating to the scrape, trample, or control treatments. *Endocladia* was also present in most other plots in all zones. Barnacles (mostly *Chthamalus* sp.) were very abundant forming nearly solid cover in the uppermost plots. Cover ranged from 20-85% in the barnacle zone. *Silvetia compressa* cover ranged from 6-91% cover in the rockweed zone, with most plots having over 50% cover of *Silvetia*. *Hesperophycus californicus* was common in several plots in the rockweed zone and four of the barnacle zone plots had nearly 30% cover or greater of *H. californicus*. *Mytilus californianus* cover ranged from 30-83% within mussel zone plots.

Within the one-meter radius fixed plots, 56 *Lottia gigantea* in were found in L1; 31 in L2; 4 in L3, with sizes ranging from 12 to 55 mm. Total number of owl limpet was *Ocenebra* and *Acanthina* were both common, though not especially abundant in any of the plots. Because of the time shortage, *Littorina* spp. and small limpets were not counted in some plots, and not all plots had any counts done. *Tegula gallina* were present in upper tidepools but did not appear in any of the plots.

***Lottia gigantea* plot summary at Cat Rock, Fall 2006**

Plot	Count Density	Area	Density	Count Sized	Mean Size	St Dev	Min Size	Max Size
1	56	3.14	17.829	56	25.98214	8.367667	12	55
2	31	3.14	9.869	31	37.45	8.83	20	52
3	4	3.14	1.273	4	36.50	13.03	17	44

21 November 2006, Middle Anacapa (West and East): Low tide -0.4 ft. at 1610 hrs. Conditions were excellent, one of the calmest days we have ever had at Anacapa. There was no wind or swell. There were three black oystercatchers, two belted kingfishers, and a harbor seal in the immediate area, though none were on the rocks at the site. A black phoebe was at the site working the rocky shore behind us. We were ashore from 1100-1615 hrs.

John Brooks was filming tidepool scenes, particularly a time lapse series of the tide along the eastern edge of the MW site. Sarah Chaney and Clark Cowen went up on the island to look for weeds and generally assess vegetation after the pelican nesting effort last year.

The plots were in good shape though we could not find any of the corners for plot 466 because of the dense mussel growth. We located the plot as best we could on memory and former photos of the plot. Photos were taken of the ANME plots but they were not field-scored and motile invertebrates were not counted there.

Photoplot summary – mean % cover by zone at Middle-West Anacapa, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	32.8	29.2	0.2	10.2	0.0	0.0	2.0
Endocladia	34.8	14.2	0.0	8.2	5.2	0.0	20.2
Silvetia (Rockweed)	11.8	1.4	0.8	4.0	0.0	44.6	7.0
Mytilus	12.4	0.0	1.4	0.0	0.0	0.0	79.0

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar	Other
Barnacle	1.6	0.0	24.0	0.0	0.0	0.0
Endocladia	0.4	0.6	16.0	0.4	0.0	0.0
Silvetia (Rockweed)	7.0	0.0	22.4	1.0	0.0	0.0
Mytilus	0.8	0.4	6.0	0.0	0.0	0.0

Photoplot summary – mean % cover by zone at Middle-East Anacapa, Fall 2006 (3 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	55.3	9.0	12.3	9.0	0.0	0.0	3.3
Endocladia	29.0	11.7	7.7	16.3	6.7	9.7	0.3
Silvetia (Rockweed)	8.3	2.0	1.0	0.7	0.0	54.0	7.7
Mytilus	0.7	0.0	1.0	0.0	0.0	0.0	96.0

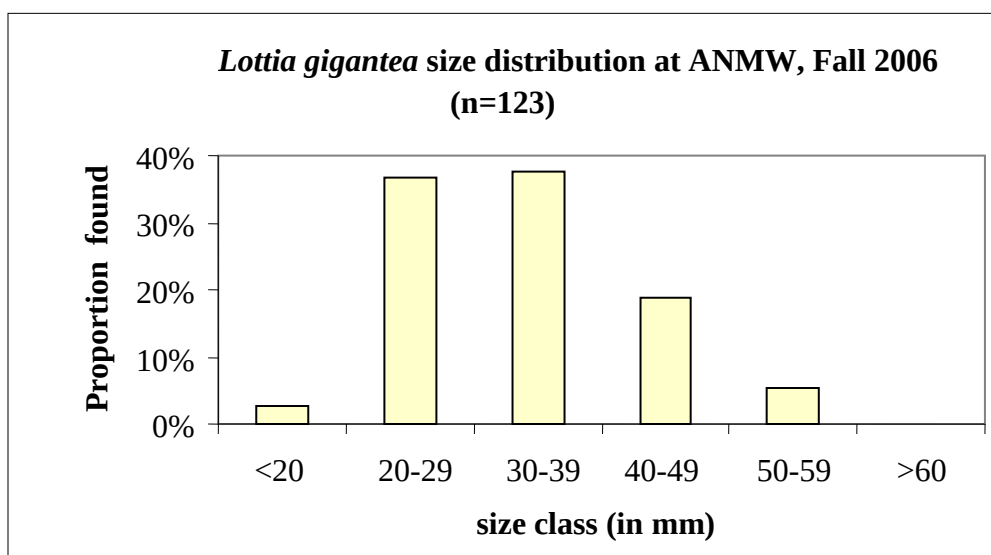
Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar	Other
Barnacle	0.0	0.0	10.3	0.7	0.0	0.0
Endocladia	0.0	0.0	18.3	0.0	0.0	0.3
Silvetia (Rockweed)	5.7	0.0	20.7	0.0	0.0	0.0
Mytilus	0.0	0.0	2.0	0.0	0.0	0.3

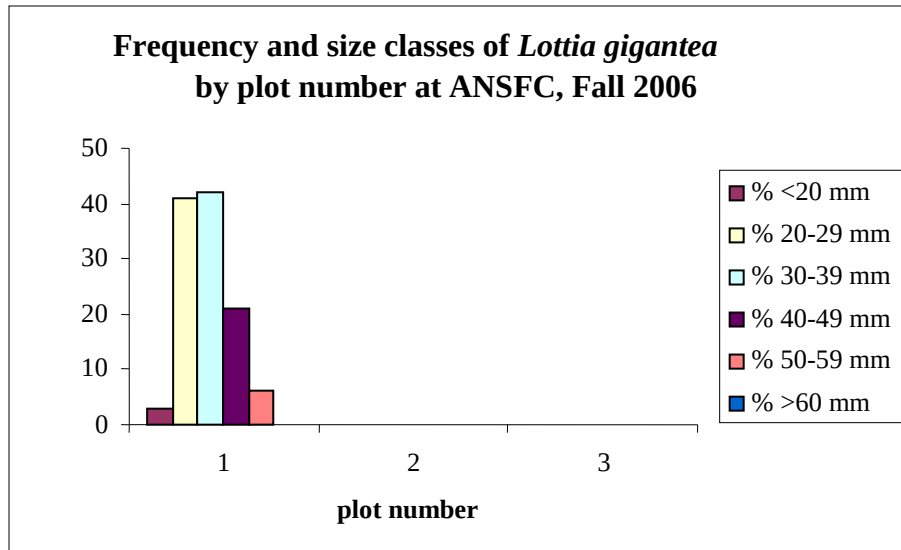
Caulacanthus ustulatus, an introduced red alga from the Indian Ocean, was found at ANMW in several small patches (<20 cm diameter) in and around plot 261. We checked the Harbor Seal

Arch area and there were many patches of *C. ustulatus* there. *Sargassum muticum* was growing there in abundance as well with very robust plants.

Mytilus californianus was abundant and recruitment appears to have been high. Mussel cover in the mussel zone plots ranged from 55-100%. Moderate recruitment of *Pachygrapsus crassipes* and *Pisaster ochraceus* was noted. Barnacle cover ranged from 15-65%. *Endocladia muricata* cover was fairly low, only 7-17%. *Silvetia compressa* was common overall though individual plants seemed thin. Cover ranged from 0-75% with the zero plot (454) being lower than the band of *S. compressa* growth. That plot has always been marginal. Motile invertebrates were common in all zones. *Acanthina* sp. was abundant, but *Nucella emarginata* and *Ocenebra circumtexta* were common also.

Five black abalone 55-115 mm were found at ANMW. No abalone were found at ANHSA. A total of 95 *Pisaster ochraceus* were found in a 30-minute search. Sizes ranged from 30 to 175 mm (radius). We also did a 30-minute search measuring owl limpets at ANMW. We measured 123 owl limpets, ranging from 17-66 mm shell length.





22 November, 2006, South Frenchy's Cove: Low tide -0.4 ft. at 1651 hrs. Water temperature was 18°C. Conditions were generally good with calm wind and sea but a light swell (2-3 ft. surf). The sand level was high at the site and the sand level to plot 254 was only 32cm. There were three black oystercatchers and a black phoebe in the area.

Sarah Chaney and Dirk Rodriguez went back to Summit Canyon to spray cape ivy. Connie Jenkins along again to shoot more images. Geoff Senning, Chris Reale, Jake Malone along to help and to see the intertidal area. They will be working with the LiMPETS program. Iesha Davis, a new SCA in interpretation was along to see the island and the monitoring program.

Most of the plots were in good shape and we were able to find most of the mussel plot corners, including all of plot 266 which we have not been able to find for at least two years and apparently from our reference photos have mistakenly shot with the wrong orientation (using the two right corners as the two left corners in some years). New bolts were placed in the upper right of plot 265 and upper left of plot 266. Only the upper left corner of plot 264 was found so the orientation of the photo may not be exact.

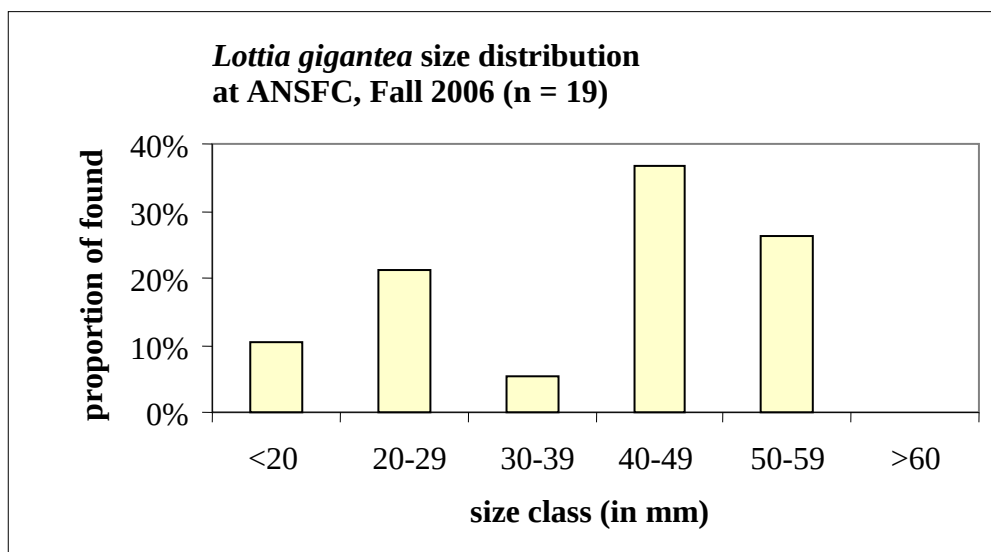
Susie counted motile invertebrates with Anna, Jeff and Jake helping her. Anna and Chris later shot the photos and measured the owl limpets. Chris and Jeff searched for seastars finding 16 but no measurements were taken. I scored photo plots with Iesha and Chris helping record. I then went to Cat Rock with Jake and Iesha to count the missing motile plots, but only had time to complete six and I did not count *Littorina* or small limpets. Jake searched for seastars for 30-minutes finding none. No additional abalone were found at either site.

Nine *Lottia gigantea* were found in L1; four in L2; and 5 in L3, with sizes ranging from 15 to 59 mm. *Nucella emarginata* were found in moderate numbers in the *Mytilus* zone plots. *Acanthina* sp. and *Ocenebra* sp. were present in low numbers in most zones.

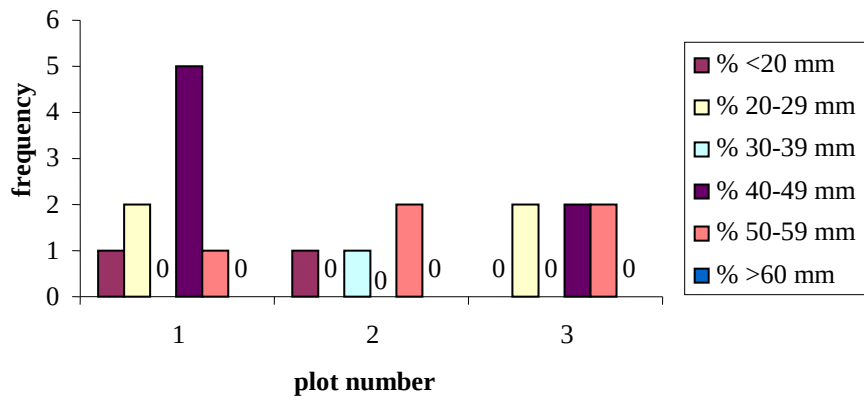
Photoplot summary – mean % cover by zone at South Frenchy's Cove, Fall 2006 (5 plots/zone):

<i>Zone</i>	<i>Bare Rock</i>	<i>Barnacle</i>	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hesperophycus</i>	<i>Silvetia</i>	<i>Mussels</i>
Barnacle	11.8	61.8	0.0	20.2	3.0	0.2	0.2
Endocladia	8.2	1.6	0.0	73.6	0.4	10.4	0.0
Silvetia (Rockweed)	8.4	9.4	0.0	4.8	0.4	62.2	0.0
Mytilus	4.0	0.0	0.0	0.0	0.0	0.0	89.4

<i>Zone</i>	<i>Turfweed</i>	<i>Leaf Barnacle</i>	<i>Misc. Algae</i>	<i>Misc. Animal</i>	<i>Tar</i>	<i>Other</i>
Barnacle	0.0	0.0	2.0	0.4	0.4	0.0
Endocladia	0.2	0.0	5.4	0.0	0.2	0.0
Silvetia (Rockweed)	3.0	0.0	11.4	0.4	0.0	0.0
Mytilus	1.6	0.0	4.8	0.2	0.0	0.0



**Frequency and size classes of *Lottia gigantea*
by plot number at ANSFC, Fall 2006**



Santa Rosa Island, November 28-December 5, 2006

(Database event #2006-D)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, Biological Technician, Channel Islands National Park
Anna Braswell, Student Conservation Association Intern at CINP
Connie Jenkins, artist in park

PROCEDURE and general observations: Standard procedures were used for monitoring the rocky intertidal sites. All plots and site overviews were photographed with an Olympus 5050 digital camera mounted on a PVC quadrapod. Scoring was performed in the field for all plots. Motile invertebrates were counted in all the photoplots. Sub-sampling of motile invertebrates was performed for littorines and small limpets when in abundance, using three 20x20 cm, or 10x10 cm, subplots as noted. Sea stars were counted and measured at all sites using a timed-search method. Abalone were opportunistically enumerated and measured only during sea star searches due to constraints in time and/or personnel. The maximum number of shorebirds and pinnipeds seen at any one time was recorded.

28 November 2006, Lagoons: The *Ocean Ranger* arrived at Santa Rosa about 1130 hrs. in very windy, cold conditions. After settling into housing, we drove out to the lagoons. Because of the hunt we were limited by our schedule made months ago. It was too windy to survey Skunk point so we just checked on the lagoons. Old Ranch lagoon had 16 mallard ducks and about 35 American coots and one great blue heron. Old Ranch House Canyon Lagoon and beach (to Old Ranch Creek) had one unidentified light colored duck, 6 dunlin, 3 surfbirds, 4 killdeer, 14 sanderling, 2 black oystercatchers, 3 western sandpiper, 1 willet, and 16 snowy plovers. We also saw a burrowing owl on the beach that flew up to a bald area on the bluff and stared at us from a crouching position. There were carcasses of a double-crested cormorant and a western gull on the rocks, both looked like predator kills. There was a small falcon at the lagoon, either a merlin or kestrel.

29 November 2006, Bee Rock and China Camp: Low tide 1.7 ft. at 1133 hrs. Conditions were excellent. The wind and seas were calm. On the drive out to Bee Rock we saw numerous deer and one small herd of elk. Two immature bald eagles were at the site of an elk carcass by Leppy trap at 0940 hrs. About eight common ravens were feeding on the carcass. We saw two more immature bald eagles flying nearby. We could not read the numbers on the blue wing tags of any of the birds. Later I saw an adult bald eagle with number 17 blue tag on its right shoulder, next to the oak trees west of Rita's road.

We got to Bee Rock beach at 1030. Small sand hills were all over the beach forming behind drift surfgrass. The only carcass was a mummified *Zalophus californianus*. On the three Bee Rock beaches and rocky points, we counted 46 snowy plovers, 9 sanderlings, 3 American pipits, 1 Say's phoebe, 2 black phoebe, 4 song sparrows, 3 common ravens, 2 black oystercatchers, 1 wandering tattler, 3 sandpipers (spotted?), and 9 harbor seals. There were no bands on any of the plovers. Susie, Anna and Connie continued to walk to China Camp and I went back to the vehicle to pick meet them at China Camp. On China Camp beach there were no snowy plovers, but there were about 150 house finches in a big flock in the back dunes and there were 257 elephant seals (including Cluster Point) most were immature males and juveniles but there were

a couple of large males. On Cluster Point beach there were 35 snowy plovers, at least 11 American pipits, 2 great blue heron, 3 sandpipers, 2 black oystercatchers, and 2 black turnstones. Susie counted 40 snowy plovers at Whetstone Canyon and 7 black turnstones, a great blue heron and an unidentified egret on other beaches. We checked the beach east of China Camp and saw about 60 elephant seals but no birds.

One of the snowy plovers on Cluster Point beach had bands with yellow over white on the right leg and yellow over yellow on the left leg. This was reported to Frances Bidstrup, who replied that the female was banded in 2006 at Marina State Beach in Monterey County

One immature elephant seal had a white square tag on the right hind flipper with Z142 and a white (typical) tag on the left hind flipper with D205. At Cluster point, *Dudleya* was being overgrown by crystalline iceplant and *Atriplex californica*.

30 November 2006, Ford Point: Low tide+0.8 ft. at 1131 hrs. Conditions were very good though there were moderate waves driven by strong southeast winds last night on the mainland. We only had light wind. There were no shorebirds or pinnipeds, just two western gulls and two song sparrows. We were onsite from 1030-1530 hrs.

All 15 plots were field-scored and motile invertebrate counts were completed. Photoplot location photos were taken with frames over the plots. No repairs were made but some number tags are unreadable and non-stainless bolts marking plot 532 should be replaced sometime.

Mytilus californianus densities were fairly low, especially in plots 532 and 534 where the seastars had eaten them. Both plots were dominated by algae, 532 by *Corallina* sp. and 534 by *Chondracanthus canaliculatus*. *Endocladia muricata* was common but not particularly dense and the percent cover in plots only ranged from 14-40%. *Chthamalus* sp. was common reflecting high recruitment though not as dense as we saw at Anacapa. *Balanus glandula* was common also.

Seastars and abalone were counted in a 30-minute search of the reef. I found 370 *Pisaster ochraceus* and one *P. giganteus*. Two black abalone (84 and 140 mm) were found. Anna measured 100 *P. ochraceus* ranging from 14 to 130 mm radius. *Littorina* spp. were common as were as *Nucella emarginata*. *Tegula funebris*, *Ocenebra circumtexta*, and *Acanthina* sp. were all present but in low numbers. A total of only 36 *Lottia gigantea* were found in the plots but sizes ranged from 14 to 77 mm.

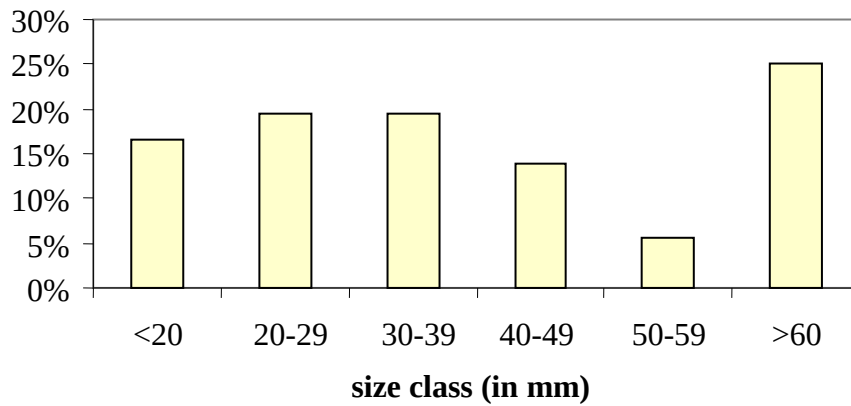
Photoplot summary – mean % cover by zone at Ford Point, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	43.8	42.6	0.0	8.2	0.0	0.0	0.0
Endocladia	34.4	1.4	0.2	29.4	0.0	0.0	4.6
Mytilus	21.0	0.2	0.0	0.4	0.0	0.0	37.4

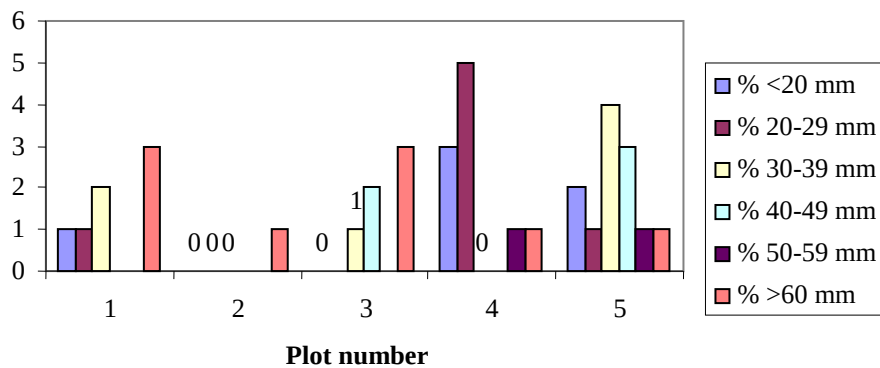
Photoplot summary – mean % cover by zone at Ford Point, Fall 2006 (5 plots/zone):

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	0.0	0.0	3.0	2.4	0.0
Endocladia	1.2	0.0	28.2	0.6	0.0
Mytilus	12.2	0.2	22.2	6.4	0.0

***Lottia gigantea* size distribution at SRFP,
Fall 2006 (n=36)**



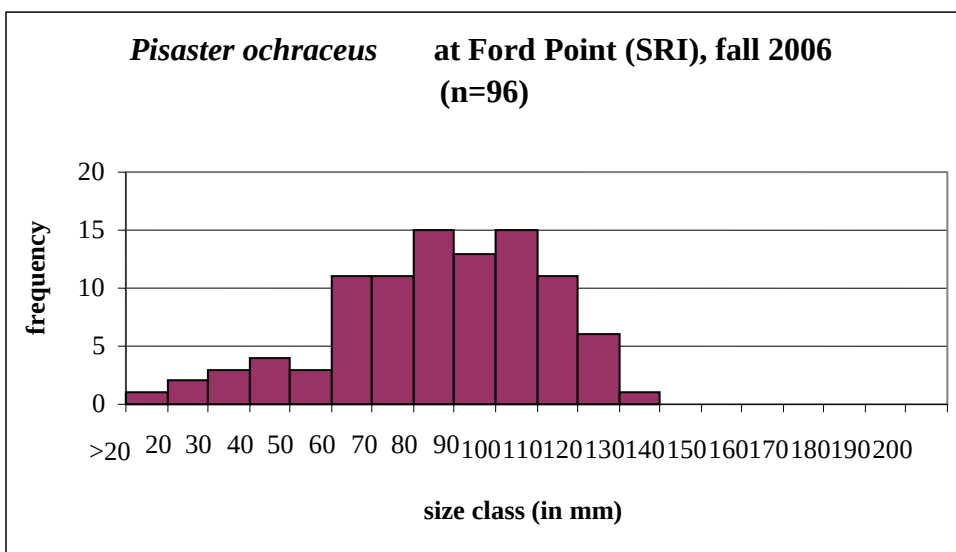
**Frequency and size classes of *Lottia gigantea* by
plot number at SRFP, fall 2006**



***Pisaster ochraceus* counts at Ford Point, Fall 2006 (30 minute count):**

TOTAL	370
count	96 (measured)
min	14 mm
max	130 mm
mean	85 mm
stdv	26 mm

Note: Due to high abundance of sea stars, a separate 30 min count was conducted from the size frequency survey.



1 December 2006, Fossil Reef: Low tide -0.1 ft. at 1322 hrs. Excellent working conditions again. Clear and calm, water temperature 14.5°C. When we arrived there were about 20 Brandt's cormorants on the reef and 10 black oystercatchers. At least 25 western gulls were feeding on the reef around us most of the day. There were two song sparrows and we also saw one American oystercatcher and one black turnstone. We were onsite from 1015-1630 hrs.

There were 90 *Pisaster ochraceus* in the 30 x 6 m transect and three black abalone. None of the abalone plots had abalone and a total of only nine black abalone were found within the site area. An additional 23 black abalone were found on the western reef, down from 37 found last year. Owl limpet plots 1 and 2 had low densities but the other three were very high. Overall we measured 191 *Lottia gigantea* in the five plots.

Chthamalus sp. recruitment has been high and there were patches of dense barnacles. *Balanus glandula* was common but nearly as abundant. Barnacle cover ranged from 22 to 63 % in the barnacle zone plots. *Silvetia compressa* was present in all five *Silvetia* zone plots for the first time in years with cover ranging from 1 to 96%. All of the *Endocladia* zone plots had high cover of barnacles with *E. muricata* cover ranging from 1 to 41%. Plot 612 with only 1% *E. muricata* cover had 59% barnacle cover. *Mytilus californianus* cover was 47 and 49% in the two highest

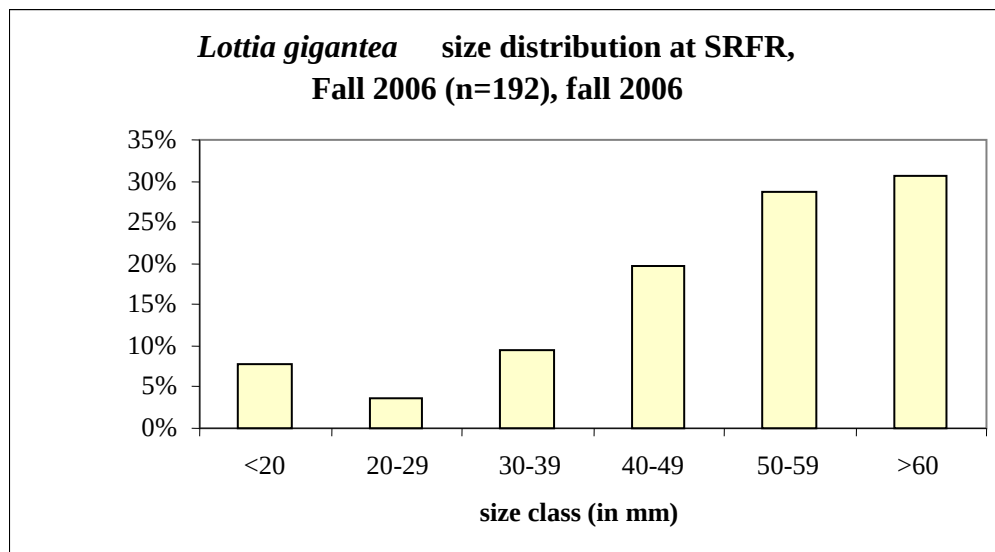
mussel zone plots but nearly absent from the lower plots due to predation from sea stars. *Tegula funebris* were very abundant in plots with *Silvetia*, to the point of needing sub-sampling in a couple plots.

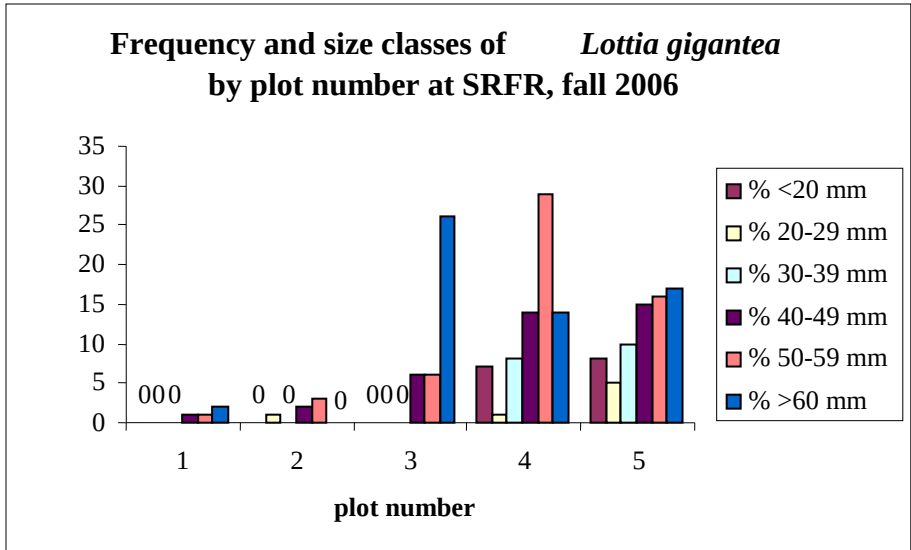
No species list was done but some noted species include *Spheciospongia confoederata*, juvenile *Girella nigricans*, *Gibbonsia* sp. *Petalochonchus montereyensis*, *Serpulorbis squamigerous*, and abundant *Phragmatopoma californica*.

Photoplot summary – mean % cover by zone at Fossil Reef, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	56.2	40.6	0.0	1.8	0.0	0.0	0.0
Endocladia	23.6	39.4	0.0	24.4	0.0	9.6	0.0
Mytilus	22.0	17.8	0.0	12.0	0.0	45.8	0.0
Hesperophycus (Rockweed)	15.6	1.4	3.8	0.0	0.0	0.0	19.6

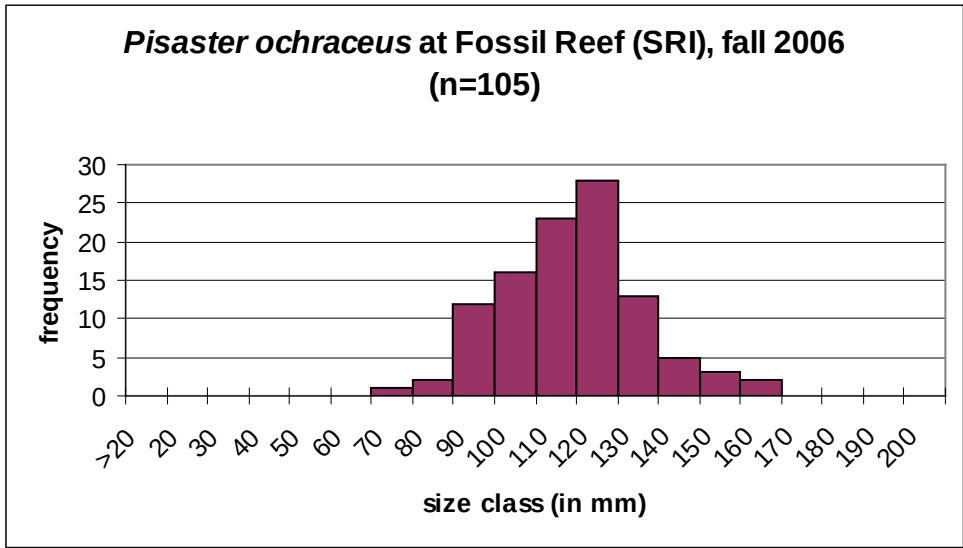
Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	0.0	0.0	0.4	0.2	0.8
Endocladia	0.0	0.0	2.0	1.0	0.0
Mytilus	0.0	0.0	2.2	0.2	0.0
Hesperophycus (Rockweed)	16.8	0.4	27.6	14.8	0.0





***Pisaster ochraceus* counts at Fossil Reef, Fall 2006**

<i>TOTAL</i>	105
count	105
min	75 mm
max	160 mm
mean	116 mm
stdv	16 mm



2 December 2006, Northwest Talcott: Low tide -0.8 ft. at 1409 hrs. Water temperature was 15°C. Excellent conditions. A beautiful, clear, calm day. Pleasant air temperature. Santa Ana winds on the mainland have left us with perfect weather. There were cormorants and pelicans on

the point at Jaw Gulch. In the intertidal we had six black oystercatchers and about forty western gulls along with a black phoebe and two song sparrows. We were on site from 1100 to 1640 hrs.

We stopped at Arlington Canyon to check for snowy plovers and found none. There were 23 mallard ducks in the lagoon. The only birds on the beach were three song sparrows, one black phoebe, and one American pipit. An immature bald eagle with a radio transmitter flew over but we were unable to read the tags. At Tecalote beach, there was a large amount of kelp wrack as there was at Arlington. We only scoped the beach from the bluff and saw two song sparrows 26 western gulls, 16 Herrmann's gulls, and eight mew gulls.

Only two *Pisaster ochraceus* (105,110 mm) and one small *P. giganteus* were found in a 30-minute search. No abalone were found. *Tegula funebris* were abundant on the upper reef flats but relatively low numbers were found in the motile invertebrate counts. One *T. gallina* was found. *Nucella emarginata* and *Ocenebra circumtexta* were common in the *Mytilus* zone plots.

A total of 96 owl limpets were measured in the five plots. Sizes ranged from 14 to 112 mm. Plot 701 had six individuals 100 mm or larger. The surfgrass transects all had nearly 100% cover of *Phyllospadix torreyi*. The general health of the surfgrass was good with only moderate bleaching and low epiphyte cover (mostly *Melobesia mediocris*).

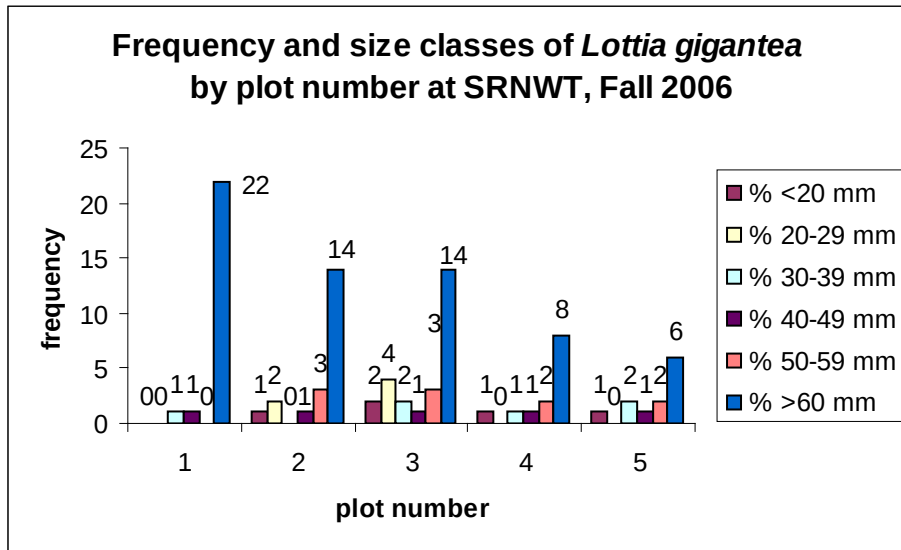
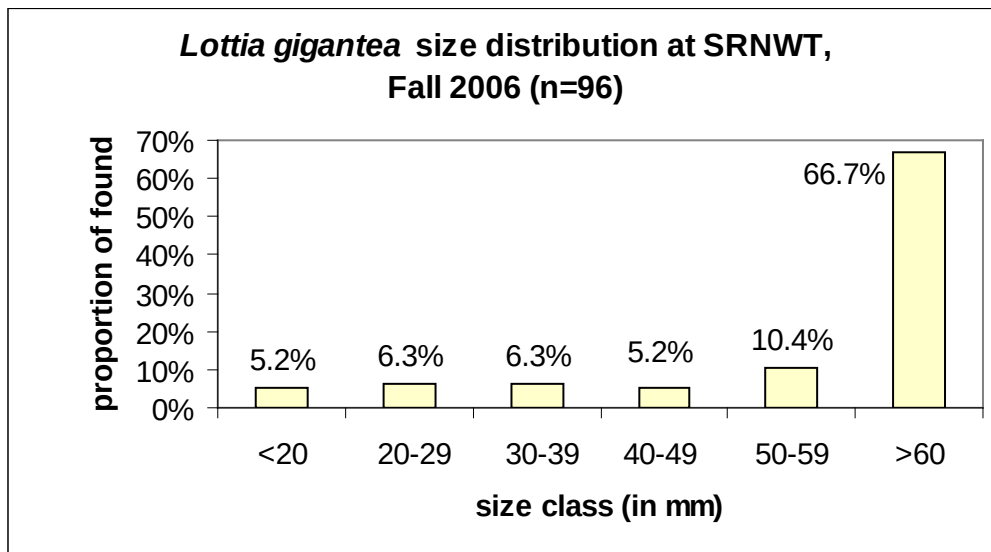
Photoplot summary – mean % cover by zone at Northwest-Talcott, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	28.4	48.2	0.0	1.0	0.0	16.2	0.0
Endocladia	45.6	1.0	0.0	22.4	0.0	18.4	0.0
Mytilus	25.0	0.2	0.0	3.4	0.0	68.8	0.0
Hesperophycus (Rockweed)	20.4	0.0	0.4	0.0	0.0	0.0	41.6

Zone	Turf-weed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	0.0	0.0	6.0	0.2	0.0
Endocladia	1.2	0.0	10.0	1.2	0.2
Mytilus	0.0	0.0	2.4	0.2	0.0
Hesperophycus (Rockweed)	11.0	4.0	21.2	1.4	0.0

Barnacle cover was high with mostly *Chthamalus* sp. dominating in very dense patches. Cover in the barnacle zone plots ranged from 10 to 88%. *Endocladia muricata* cover in the *Endocladia* zone ranged from 3 to 30%. Only plot 559 had less than 20% *E. muricata* cover with most of the plot being bare rock or non-coralline crusts (mostly *Ralfsia* sp.). *Silvetia compressa* had high cover in plots 555 and 557. *Silvetia* zone plots all had high percent cover of *S. compressa* except plot 569. Cover of *S. compressa* ranged from 10 to 98%. *Mytilus californianus* cover was relatively low at 24-67%. Various algae, mostly articulated corallines shared the plots. *Gelidium coulteri* was common in several and was often growing on mussel shells, and so was not scored as cover, thus the photos will appear to have higher *Gelidium* cover.

I made a species list while searching for seastars and we spent a little time after finishing plots to look around. Several juvenile *Octopus bimaculatus* were found. Numerous fish were present including juvenile *Girella nigricans*, *Gibbonsia* sp., cottids, juvenile *Cebidichthys violaceus*, *Gobiosoma meandricus*, and two blind gobies *Typhlogobius californiensis*, under a rock with their commensal ghost shrimp. *Cirrolana harfordi* isopods and sipunculids were common under some rocks. Various sponges and tunicates were present.



***Pisaster ochraceus* counts at Northwest-Talcott, Fall 2006**

<i>TOTAL</i>	<i>2</i>
count	20
min	105 mm
max	110 mm

Note: Only two *Pisaster ochraceus* and one *P. gigantea* were found in a 30 minute search of SRNWT; no histogram.

Surfgrass transects at Northwest-Talcott, Fall 2006 (additional taxa with 0 values deleted from table):

<i>Location: Northwest Talcott</i>			
<i>Site Code: SRNWT</i>			
<i>Date: 2-Dec-06</i>			
<i>Recorders: Dan Richards</i>			
<i>Surf Grass Taxa</i>	<i>Transect 1</i>	<i>Transect 2</i>	<i>Transect 3</i>
other green algae			1
other red algae		1	8
<i>Phyllospadix</i> sp. overstory	100	99	91
total	100	100	100

3 December 2006, East Point: Low tide -1.2 ft. at 1455 hrs. Southeast winds and waves until midafternoon from the Santa Ana conditions on the mainland. Good working conditions though. Water temperature was 16°C. We were on site from 1145-1700 hrs.

Shorebird counts at Skunk Point beaches were done in the morning. We counted a total of 76 snowy plovers, 444 sanderling, 278 black-bellied plovers, 3 long-billed curlew, 3 whimbrel, 1 western sandpiper, 1 killdeer, 3 song sparrows, 12 American pipit, 8 common raven, 30 house finch, 10 black oystercatcher, 8 brown pelican, 1 double-crested cormorant, approximately 50 western gulls, 8 American widgeon, 16 mallards, 1 great blue heron, and 47 American coots.

At East Point, there were about 50 cormorants on the bluff and reef when we arrived. There were 10 black oystercatchers in the area. A peregrine falcon flew off with prey from the western reef as we approached. While we were working, what looked like a jaeger was chasing a tern, trying to steal food.

Photoplot summary – mean % cover by zone at East Point, Fall 2006 (5 plots/zone):

<i>Zone</i>	<i>Bare Rock</i>	<i>Barnacle</i>	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hesperophycus</i>	<i>Silvetia</i>	<i>Mussels</i>
Barnacle	27.0	54.2	0.0	13.2	3.8	0.0	0.0
Endocladia	14.4	8.4	0.0	68.4	4.6	1.0	0.0
Silvetia (Rockweed)	16.6	12.4	0.0	4.4	0.8	45.0	0.2
Mytilus	1.4	1.2	0.2	0.0	0.0	0.0	82.6
Hesperophycus (Rockweed)	9.8	25.0	0.0	39.6	21.8	2.0	0.0

Photoplot summary – mean % cover by zone at East Point, Fall 2006 (5 plots/zone) (continued):

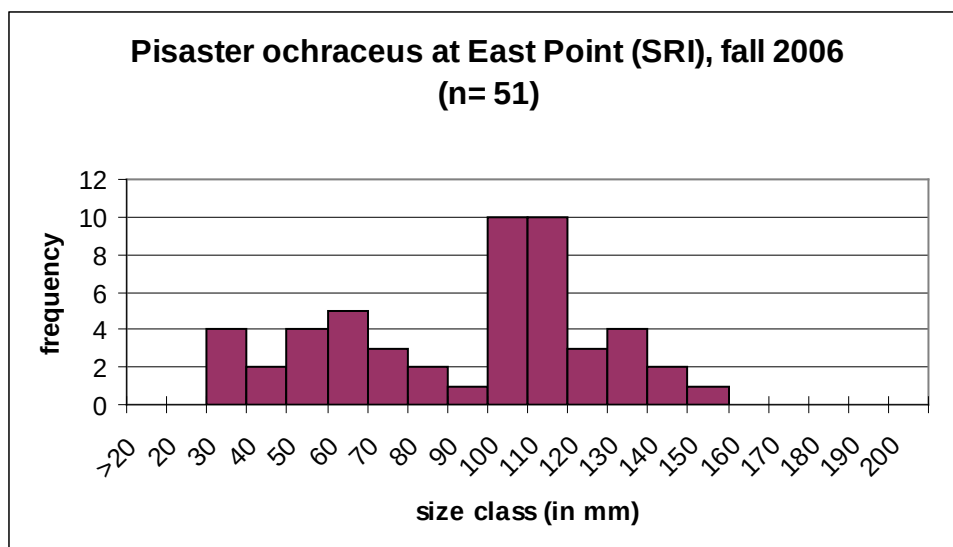
Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	0.0	0.0	1.6	0.2	0.0
Endocladia	0.0	0.0	3.0	0.2	0.0
Silvetia (Rockweed)	0.0	0.0	19.2	1.4	0.0
Mytilus	2.4	0.0	10.6	1.6	0.0
Hesperophycus (Rockweed)	0.0	0.0	1.8	0.0	0.0

Silvetia compressa was fairly lush and abundant on the reef. Cover in plots ranged from 10-89%. New plants of *Hesperophycus californicus* were common but not very large so cover was not particularly high ranging from 3-35% in plots. *Endocladia muricata* was very dense with cover of 54-78% and *Chthamalus* sp. had high recruitment as at the other sites with cover ranging from 17% in a plot with high *E. muricata* cover to a remarkable 86%. *Mytilus californianus* was also abundant with cover of 45-97%.

Acanthina sp. was common in all zones except the mussel zone, and sizes ranged from 5-16mm. *Tegula funebris* was common with many small individuals and sizes ranged from 6-20 mm. *Ocenebra circumtexta* and *Nucella emarginata* were present but not especially abundant. Only 51 *Pisaster ochraceus* were found in the 30-minute search, though several young stars were found. Sizes ranged from 30-155 mm radius. Only one black abalone (130 mm) was found. *Phyllospadix torreyi* was abundant and doing very well. Cover of *Phyllospadix* in the surfgrass transects was nearly 100% in all transects. Bleaching was surprising low with the low tides we have been experiencing. *Melobesia mediocris* cover was very high and *Smithora* was common in patches.

***Pisaster ochraceus* counts at East Point, Fall 2006**

TOTAL	51
count	51
min	30 mm
max	155 mm
mean	92 mm
stdv	33 mm



Surfgrass transects at East Point, Fall 2006 (additional taxa with 0 values deleted from table):

Location: East Point		Site Code: SREP	
Date:3-Dec-06			
Recorders: Dan Richards			
Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Egregia menziesii	5	12	
other red algae			2
Phyllospadix sp. overstory	95	88	98
Phyllospadix sp. understory	5	11	
total	105	111	100

4 December 2006 Johnson's Lee: Low tide -1.4 ft. at 1540 hrs. Perfect weather again, very calm and clear. Water temperature 16°C. We surveyed Soledad beach from 0900 to 1100 hrs. before going to Johnson's Lee. We were on site at JL from 1230-1700 hrs.

The sand was high at Soledad allowing access around the rocky points despite the high tide. We saw six bald eagles; one adult (tag #21), and five immature (three tags read- #49, #52, #60). We saw one snowy plover. There were no other shore birds. Song sparrows, house finches and ravens were the only other birds. Other than two deer carcasses that had the attention of the eagles, there was only one old sea lion carcass. Either the sea conditions have not been conducive to depositing carcasses or the sand is burying them because we saw very few all week.

The sand was the highest I have ever seen at Johnson's Lee, completely burying the tidepool and lower rock shelves. Photo plots 504, 505, 513, and 514 were under at least 6 inches to a foot of sand by my estimate. Owl limpet plots 595, 596 and half of 597 were also buried under sand. The sand level came up within a few centimeters of the bolt of 597. There were several owl limpets huddled on a rock sticking out of the sand that may have been the upper part of plot 596. This may explain why the density of owl limpets has dropped in several of the plots over recent years if this happens occasionally.

I found four black abalone (85, 102, 105, and 168 mm). There were 13 *Pisaster ochraceus* in the seastar transect. Area 1 (the western portion of reef) had 91 *P. ochraceus*. The middle area (area 2) which was mostly under sand had 36 *P. ochraceus*, and area 3 had 54 *P. ochraceus*. Sizes of *P. ochraceus* were mostly small ranging from 25 to 135 mm but there were few over 100 mm.

Sand scour seemed a possibility in plots 506 and 509 and there was loose sand in plots 510 and 511. *Chthamalus* sp. were abundant, having had high recruitment like the other sites. *Balanus glandula* were common, especially in plot 501, and seemed especially large. *Endocladia muricata* was doing well except where it was partially buried by sand. Motile invertebrate counts were relatively low in all plots, except for *Littorina* spp. in the barnacle zone plots, and limpets in the *Endocladia* zone. *Nucella emarginata*, *Acanthina* sp. and *Tegula* spp. were present.

Photoplot summary – mean % cover by zone at Johnson's Lee, Fall 2006 (5 plots/zone*):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle*	56.0	40.4	0.0	1.8	0.0	0.0	0.0
Endocladia*	62.0	1.2	0.4	26.8	0.0	0.0	7.8
Mytilus*	52.6	0.2	0.0	0.0	0.0	0.0	13.4

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle*	0.0	0.0	0.6	1.2	0.0
Endocladia*	0.2	0.0	1.2	0.4	0.0
Mytilus*	18.2	0.4	11.4	3.8	0.0

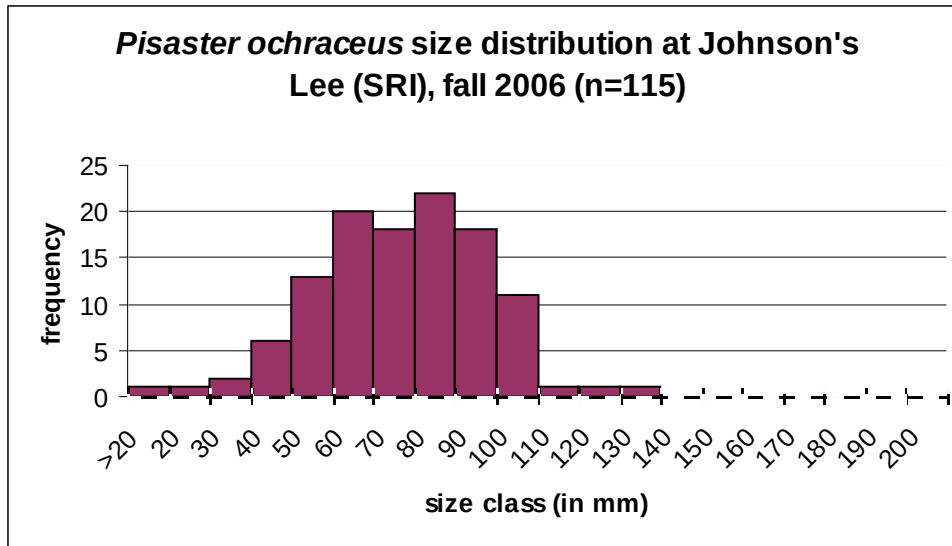
* some plots inundated by sand.

***Lottia gigantea* plot summary at Johnson's Lee, Fall 2006**

Plot	Count Density	Area	Density	Count Sized	MeanSize	StDev	MinSize	MaxSize
1	70	9.42	7.429	70	38.26	19.74	12	87
2	107	12.56	8.516	107	42.69	22.78	13	91
3	103	15.71	6.558	103	41.66	22.48	11	93

***Pisaster ochraceus* counts at Johnson's Lee, Fall 2006**

TOTAL	115
count	115
min	16 mm
max	135 mm
mean	74 mm
stdv	20 mm



Bird List:

Mallard duck	American widgeon
American coot	Surf scoter
Surf bird	Killdeer
Snowy plover	sanderling
Western sandpiper	(Spotted?) sandpiper
Black oystercatcher	American Oystercatcher
Black turnstone	Wandering tattler
Dunlin	Willet
Whimbrel	Long-billed curlew
Black phoebe	Say's phoebe
Spotted towhee	White crowned sparrow
Song sparrow	Western meadowlark
Horned lark	European starling
Burrowing owl	Red tail hawk
Coopers hawk	Bald eagle
Northern harrier	American kestrel
Peregrine falcon	Merlin?
Great blue heron	Unid. egret
American goldfinch	House finch
American pipit	Common raven
Northern mockingbird	Brown pelican
Brandt's cormorant	Royal tern
Mountain bluebird	Unid. loon
Western gull	Western grebe
Herrmann's gull	Mew gull
Parasitic jaeger?	California quail

Santa Cruz Island, December 17-22, 2006

(Database event #2006-E)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Anna Braswell, SCA Intern, CINP
Kenneth Niessen, Biologist/Consultant, CINP

PROCEDURE and general observations: We took the Island Packer vessel *Island Adventure* to Santa Cruz Island, arriving at Prisoner's Harbor at approximately 1100hrs. Transit across was fairly rough as some weather had moved through the day before. Upon arrival we went directly to the Prisoners site. Standard monitoring procedures were used at all rocky intertidal sites. Plots and site overviews were photographed with an Olympus 5050-Z digital camera. Scoring was conducted in the field for percent cover and for motile invertebrates* as time-permitted; in two cases (Forney's Cove, Prisoner's) a return visit was required. [**Note: Motile invertebrate counts were conducted during the fall season as no monitoring of sites was conducted in spring 2006 (except at Orizaba and Scorpion)*]. Owl limpets were measured within 1-m radius circular plots and, when, at Fraser Cove, frequencies were low (e.g. < 5 individuals per 1-m) within a 1.5-m radius. Surfgrass transects were read at both Trailers and Fraser Cove. Seastars were counted and measured at all sites. The maximum number of shorebirds and pinnipeds seen at any one time was recorded. Abalone searches were limited to a 30-minute concurrent search for seastars unless otherwise noted. PIT tagging of abalone at Trailer (n=1) and Willow Anchorage (n=33) occurred during this tour.

17 December, Prisoner's Harbor. Low tide -0.1 ft. at 1418 hrs. Conditions were clear and cold with 1-2' wind waves. Rain yesterday of approximately 0.25 inches. Water temperature measured 14.5°C. When we arrived, there were no birds or marine mammals at the site. One harbor seal watched us from just offshore at 1430. One western gull, a black oystercatcher, a western sandpiper and a black phoebe were seen during our visit. We were onsite from 1130 – 1530 hrs.

Photoplots were shot by Dan and Susie. An intermittent problem with the digital camera has been presenting itself (difficulty turning on, or restarting from energy-saving mode), and is thought possibly temperature-related or battery related. The media card was erased and reformatted in the field. Pans from each of the reference bolts and other area photos (mussels) were taken. Dan scored all 25 photoplots in the field. Susie and Anna proceeded to score plots for motile invertebrates, with Ken recording. All but three mussel plots (M1, M3, M4) were surveyed - those plots were being washed over too frequently from the 'wrap-around' wave action. The three motile plots left un-sampled were field-scored on December 21st, by Susie, Anna and Ken on their way off-island.

There was high recruitment of *Chthamalus* in upper zone, while *Balanus* dominates in lower parts of the reef. *Silvetia compressa* was small and sparse. Some *Hesperophycus californicus* were present on the west side above plot Pe4. *Chthamalus* was especially dense in the upper barnacle plots. *Balanus glandula* was common also and were common on mussel shells in the lower intertidal. *Endocladia* was partly buried by *Scytosiphon dotyii*, which was extremely dense on the west side. *Mytilus californianus* were mostly small and dense in the mussel zone plots.

Endocladia muricata was fairly short and mostly bleached but seemed to be fairly high cover overall. *Nucella emarginata*, *Acanthina* sp. and *Tegula funebris* all seemed fairly common. Dan did find a few *T. gallina* also. *Ceramium* sp. was common and *Endarachne binghamiae* was common in patches. *Scytosiphon* was common on the western reef especially in the area of Pe1 and Pe2 where there was no *Silvetia* growing.

We stayed at the UC Reserve station tonight. A group of restoration volunteers were also using the UC Reserve facilities. Lyndal was off-island, but returned on Tuesday (prior to our departure).

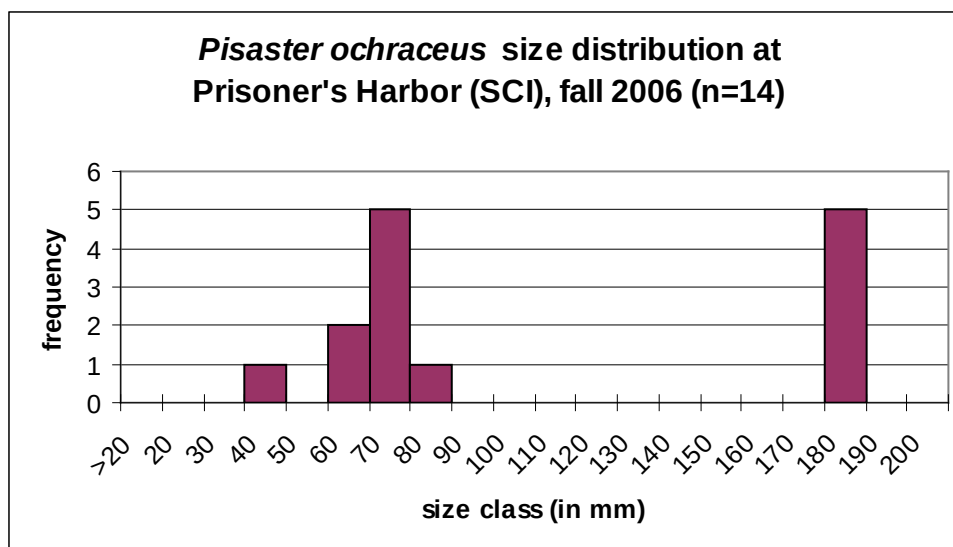
Photoplot summary – mean % cover by zone at Prisoner's Harbor, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	20.2	6.8	0.4	7.0	0.1	0.0	0.3
Endocladia	15.6	5.1	0.0	19.3	4.8	0.0	1.0
Silvetia (Rockweed)	12.3	6.8	1.0	2.2	0.0	12.7	1.3
Mytilus	0.0	0.0	0.0	0.0	0.0	0.0	49.9
Hesperophycus (Rockweed)	13.2	17.8	0.0	9.4	7.1	0.6	0.8

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	2.8	0.0	11.7	0.7	0.0
Endocladia	0.0	0.0	3.8	0.4	0.0
Silvetia (Rockweed)	0.8	0.0	12.3	0.6	0.0
Mytilus	0.0	0.0	0.0	0.1	0.0
Hesperophycus (Rockweed)	0.2	0.0	0.7	0.2	0.0

***Pisaster ochraceus* counts and size frequency histogram at Prisoner's Harbor, Fall 2006:**

TOTAL	14
count	14
min	40 mm
max	180 mm
mean	106 mm
std dev	58 mm



Refer to Appendix D in annual report for motile invertebrate count data at Prisoner's Harbor, Santa Cruz Island, Fall 2006

18 December, Fraser and Forney Coves. Low tide -0.5 ft. at 1452 hrs. Waves were mostly moderate with occasional large sets and an 8' break. Conditions were clear and sunny. Following a two hour trip from the field station (and a brief pass of Christy's Ranch to check on accommodations), we were in the intertidal from about 1130 – 1700 hrs. We made a brief visit to Forney's Cove at ~1630 to shoot the photoplots before dark. A return visit to perform percent cover and motile counts was completed the following day (see entry December 19 below).

We commenced sampling the higher plots at about 1200 on an outgoing tide, with Dan scoring percent cover and Susie and Anna (w/ Ken recording) doing motile counts. When Dan was done field-scoring (approx. 1445), Susie and he paused to take area and plot photos as the tide had dropped substantially. Dan then scored surfgrass transects (with some significant soakage from wave sets) while Susie and Anna (and Ken) surveyed *Lottia* plots. Dan then performed a timed search for *Pisaster* and abalone from 1535 until 1605. No abalones were found. *Pisaster* was not very apparent upon first glance, although quite a few around the lower edge of the mussel bed (variously sized) were found. Most seastars found near R3 were of smaller diameter, while larger ones were located nearer to R2. No new tar but a lot of weathered tar seen.

Owl limpet, *Lottia gigantea*, sizes at Fraser's ranged from 16 to 91 mm, with most being in the 35-60 mm size-range. Plots L4 and L5 had 12 and 11 individuals, respectively. L2 and L3 had only a few owl limpets (n=3) so a 1.5-m radius was also sampled. Most *Lottia* plots were primarily comprised of a patchwork of mussels with bare spots & algae interspersed. L5 has seen some return of mussels which had been denuded the year previously, as well as a good amount of *Endocladia*.

Phyllospadix was patchy as if beaten by waves and bare patches of mussels and barnacles were noted. Sand level at Forney's Cove was high. Conditions of plot markers were good, excepting for a bent and loose SG-1 bolt, and the lower left (LL) marker of M3 missing (or buried by mussels).

After finishing the protocol at Fraser's, we walked to Forney's Cove to take plot photos. Plots were challenging to find without the site map. The setting sun precluded us from doing anything other than taking photos.

We arrived back at Christy's Ranch at 1745 hrs. Dr. Michael Glassow, archeologist with UCSB, and three of his doctoral students were staying at the ranch and graciously allowed us to pitch our tents in front of the adobe and share kitchen/ front room privileges. This was a welcomed change of our itinerary as, after late field days and early sunsets, air temperatures seemed quite "winter-like" (crisp, w/ clear skies; upper 30's at night); the lean-to has seen minimal usage of late.

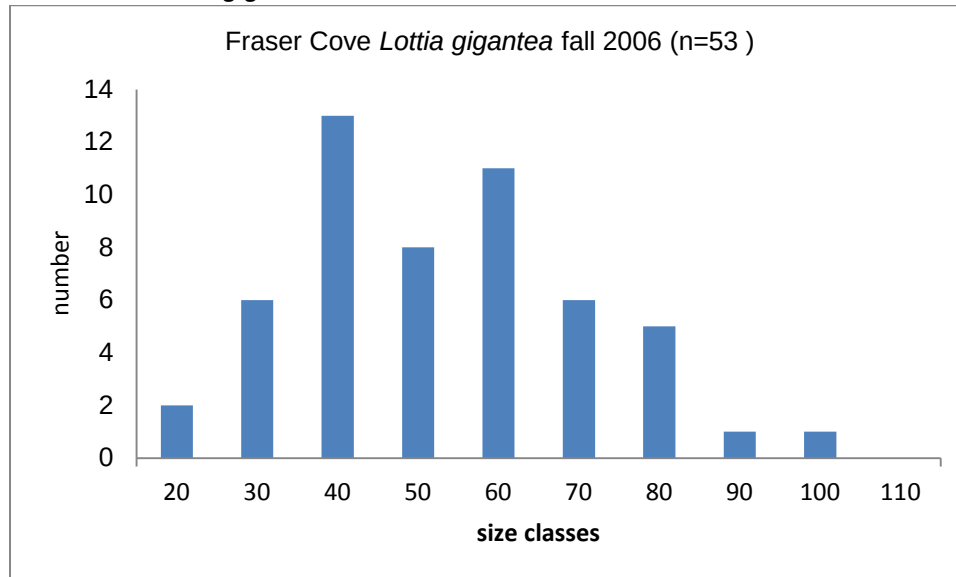
***Lottia gigantea* plot summary at Fraser Cove, Fall 2006**

Plot	Count	Area	Density	MeanSize	StDev	MinSize	MaxSize
1	9	3.14	2.865	60.00	12.52	31	75
2	11	7.08	1.554	55.73	18.80	38	91
3	11	7.08	1.554	56.73	18.09	19	82
4	12	3.14	3.820	34.58	11.00	16	53
5	11	3.14	3.502	40.27	12.38	27	60

Size frequency distribution of *Lottia gigantea* at Fraser Cove Fall 2006

%< 20mm	%20- 29mm	%30- 39mm	%40- 49mm	%50- 59mm	%60- 69mm	%70- 79mm	%80- 89mm	%90- 99mm	%>= 100mm
0.00%	0.00%	11.11%	0.00%	33.33%	44.44%	11.11%	0.00%	0.00%	0.00%
0.00%	0.00%	9.09%	54.55%	0.00%	9.09%	9.09%	9.09%	9.09%	0.00%
9.09%	0.00%	9.09%	0.00%	45.45%	9.09%	18.18%	9.09%	0.00%	0.00%
8.33%	25.00%	33.33%	25.00%	8.33%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	18.18%	45.45%	0.00%	27.27%	9.09%	0.00%	0.00%	0.00%	0.00%

Fraser Cove *Lottia gigantea* size distribution Fall 2006

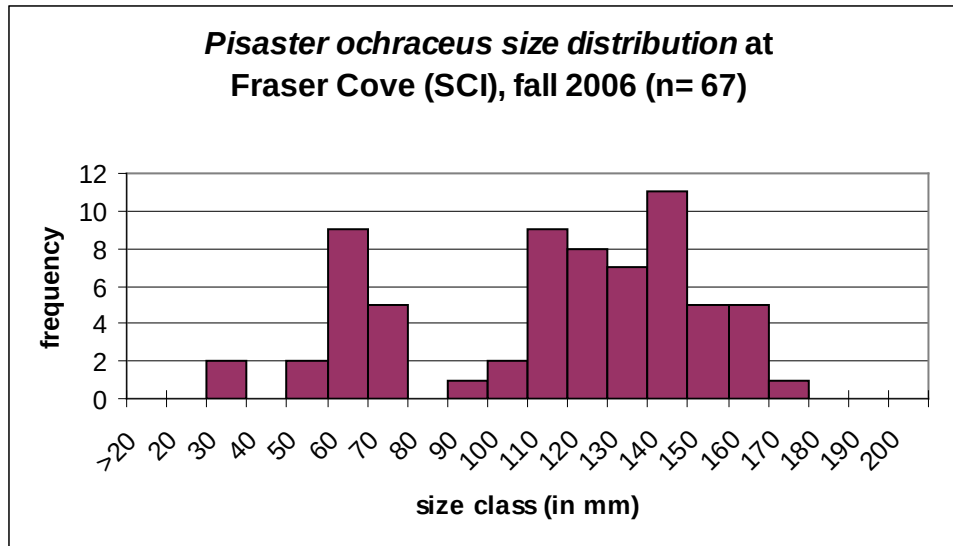


Surfgrass transects at Fraser Cove, Fall 2006 (additional taxa removed from table when not present):

Location: Fraser Cove		Site Code: SCFC	
Date: 18 Dec 2007			
Recorders: Dan Richards			
Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Rock	8	10	7
Sand	0	0	1
Crustose coralline	1	0	1
Erect coralline	7	0	12
other red algae	6	2	9
<i>Phyllospadix</i> sp. Overstory	74	81	66
<i>Phragmatopoma californica</i>	0	6	3
<i>Chthamalus/Balanus</i>	0	0	1
<i>Mytilus californianus</i>	2	0	0
	2	1	0
total	100	100	100

***Pisaster ochraceus* counts and size frequency histogram at Fraser Cove, Fall 2006:**

TOTAL	67
count	67
min	35 mm
max	170 mm
mean	112 mm
stdv	36 mm



19 December, Trailer and Forney's. Low tide -0.7 ft. at 1528 hrs. Clear, sunny and calm. Swell was moderate with a light wind. All and all, a very pleasant day. One cormorant, 3 gulls, an oystercatcher and a common raven were seen upon arrival. One harbor seal was just offshore. We were on site from 1130 until 1700 hrs.

We started working again with the outgoing tide. Susie and Anna counted motile invertebrates with Ken recording. Dan scored plots. Susie and Dan broke in the middle of the afternoon to shoot photos. Dan then scored surfgrass transects (not as wet as the day before) and measured sea stars for 30 minutes. He found one black abalone on the site during that 30 minute search, but then continued searching to the south of the site boundary finding 29 abalone, including one withered, sick abalone and one withered and dead. A photo was taken of the dead animal and the shell was marked with epoxy (TR 12-19-06). The one abalone, near M5, measured 143 mm and was tagged with a pit tag cemented with z-spar. *Chthamalus* recruitment was high; the lowest barnacle cover recorded as 67%. Dead *Balanus* were apparent but not as much as we have seen previously.

Susie made impromptu plot repairs with the extra z-spar from pit tagging to several deteriorating patches of z-spar in the mussel plots which are migrating up marker bolts.

We departed Trailers site about 1600 and returned to Forney's Cove to quickly field-score and count for motiles in the *Hesperophycus* and *Silvetia* plots. We stayed on-site about 1 hour (1630 to 1730) and after sunset used headlamps to improve plot illumination.

The drive from Forney's back to Christy's was about 45 minutes. Following dinner, photos were downloaded, field logs written and datasheets checked and/or transcribed as needed. Camera was trouble-shot for continuing unresponsive problem.

Photoplot summary – mean % cover by zone at Trailer, Fall 2006 (5 plots/zone except Hesperophycus which is 6 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	17.8	75.6	0.0	4.6	0.0	0.0	0.2
Silvetia (Rockweed)	8.0	5.4	0.0	1.8	0.0	83.0	0.0
Mytilus	17.0	0.6	0.2	0.0	0.0	0.0	41.6
Hesperophycus (Rockweed)	18.8	20.7	0.0	12.3	17.3	29.7	0.0

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar	Other
Barnacle	0.0	0.0	0.0	1.8	0.0	0.0
Silvetia (Rockweed)	0.0	0.0	1.8	0.0	0.0	0.0
Mytilus	1.2	0.2	23.0	16.2	0.0	0.0
Hesperophycus (Rockweed)	0.0	0.0	1.0	0.2	0.0	0.0

***Lottia gigantea* plot summary at Trailer, Fall 2006**

Plot	Count	Area	Density	MeanSize	StDev	MinSize	MaxSize
1	13	3.14	4.139	76.38	18.41	37	92
2	16	3.14	5.094	67.75	8.27	48	82
3	1	3.14	.318	55.00		55	55
4	6	3.14	1.910	61.50	14.07	46	80
5	0	3.14					

Size frequency distribution of *Lottia gigantea* at Trailer Fall 2006

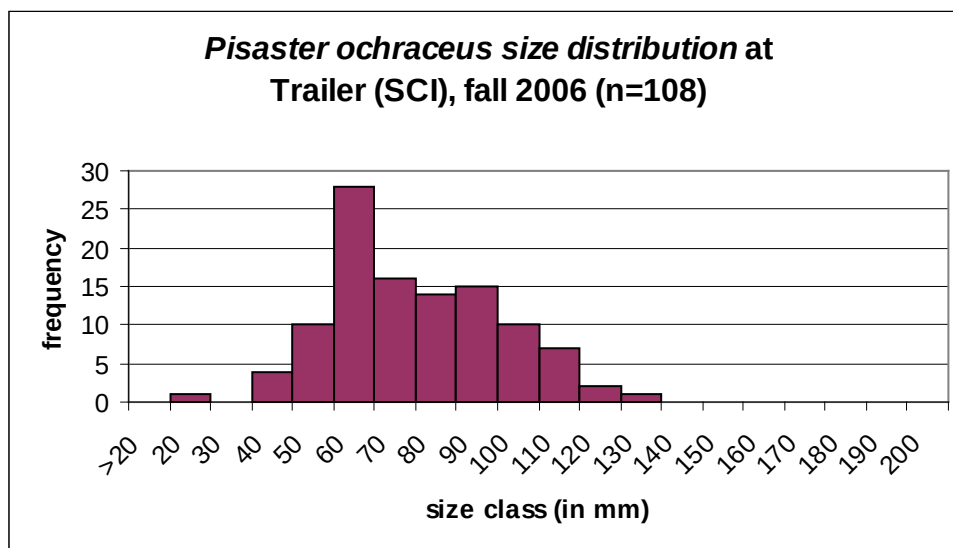
%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm	%80-89mm	%90-99mm	%>=100mm
0.00%	0.00%	7.69%	7.69%	7.69%	7.69%	0.00%	46.15%	23.08%	0.00%
0.00%	0.00%	0.00%	6.25%	12.50%	31.25%	43.75%	6.25%	0.00%	0.00%
0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	0.00%	0.00%	16.67%	50.00%	0.00%	16.67%	16.67%	0.00%	0.00%

Black abalone, *Haliotis cracherodii*, at Trailer, Fall 2006

Count Random	Count Sized	MeanSize	StDev	MinSize	MaxSize	%<45mm	%45-126mm	%127-145mm	%>145mm
28	10	114.70	32.30	60	147	-	50.00%	40.00%	10.00%

***Pisaster ochraceus* counts and size frequency histogram at Trailer, Fall 2006:**

<i>TOTAL</i>	<i>127</i>
count	108
min	20 mm
max	130 mm
mean	75 mm
stdv	21 mm



Surfgrass transects at Trailers, Fall 2006 (additional taxa removed from table when not present)

Location: Trailer		Site Code: SCTR	
Date: 19 Dec 2007			
Recorders: Dan Richards			
Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Rock	2	3	5
<i>Egregia menziesii</i>	1	0	4
Erect coralline	3	9	14
other red algae	5	4	17
<i>Phyllospadix</i> sp. Overstory	87	83	56
<i>Phyllospadix</i> sp. Understory	0	0	1
<i>Mytilus californianus</i>	2	1	4
<i>Phragmatopoma californica</i>	2	1	4
total	100	100	101

20 December, Willows Anchorage. Low tide -0.9 ft. at 1605 hrs. (Left Christy's at about 1000 and reached the end of the drivable portion of Willow Canyon at 1145. The hike from the car to the site took about 35 minutes). The weather was beautiful and clear, though slightly cool when the sun dipped behind the cliff from a light breeze blowing across the reef. Many squid boats were at anchor in the cove, including one pleasure-craft nearshore with kids and a barking dog. Four black oystercatchers (on the island) and one black phoebe were seen. Several pelicans and

100 or so gulls also on island. Occasional sets washed the *Mytilus* plots but otherwise the conditions were very workable. We were on site from 1220 to 1700 hrs.

Both *Hesperophycus* and *Silvetia* were fairly sparse over much of the reef. Anna and Dan shot photos first and had much difficulty locating *Mytilus* and *Lottia* plots. Susie and Ken commenced with motile scoring (joined by Anna after photos), leaving rockweed plots last for Dan to score before disturbing canopy. *Tegula funebris* numbers were high and *T. gallina* was common. Dan finished all the scoring and moved on to measuring sea stars and abalone. He found 25 abalone in a 30-min search over the site and one more to the west later. Sizes ranged from 45-112 mm, and individuals occurred mostly in clusters and out in the open. Dan found 178 *Pisaster ochraceus* in 30 minutes measuring most, plus taking 29 more measurements after. *Mytilus* recruitment was high w/ dense growth several layers thick. *Endocladia* was about 30% bleached.

Beach sand seemed fairly high, although there was no sand on the reef and no scour of the plots observed. An aggregation of *Aplysia californica* was seen in the bench depression that spans between the *Silvetia* and *Endocladia* plots.

Photoplot summary – mean % cover by zone at Willows Anchorage, Fall 2006(5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Endocladia	13.4	8.2	1.0	70.8	0.0	0.0	0.0
Silvetia	7.8	15.0	0.0	19.2	0.0	29.0	0.0
(Rockweed)							
Mytilus	3.0	0.0	1.2	0.0	0.0	0.0	92.2
Hesperophycus	17.0	21.0	0.0	15.4	2.0	28.2	0.0
(Rockweed)							

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal
Endocladia	0.0	0.0	6.0	0.6
Silvetia	0.6	0.0	27.4	1.0
(Rockweed)				
Mytilus	0.0	0.4	2.0	1.2
Hesperophycus	0.0	0.0	15.8	0.6
(Rockweed)				

***Lottia gigantea* plot summary at Willows Anchorage, Fall 2006**

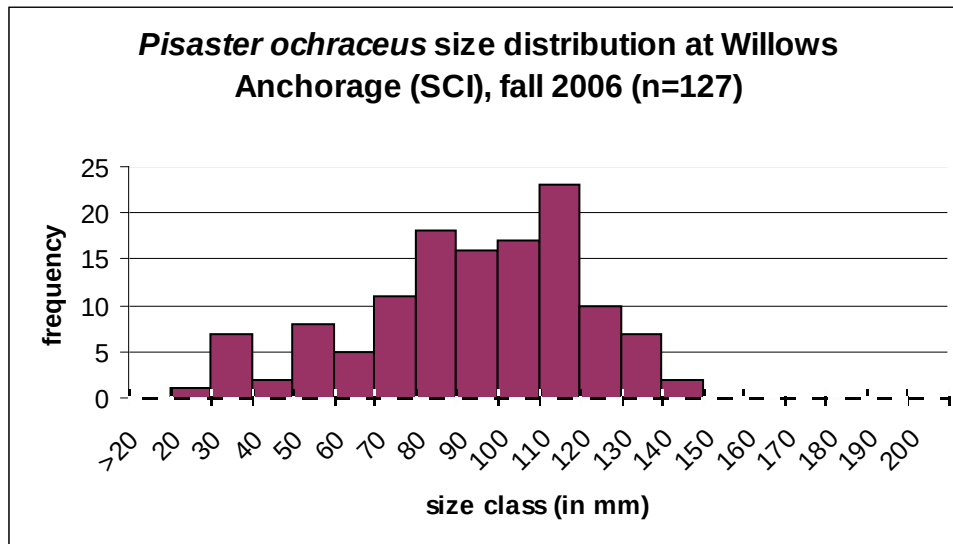
Plot	Count	Area	Density	Mean Size	St Dev	Min Size	Max Size
1	17	3.14	5.412	34.82	12.09	19	62
2	6	3.14	1.910	40.17	15.59	24	65
3	12	3.14	3.820	33.00	9.20	21	51
4	11	3.14	3.502	41.27	8.64	29	58
5	3	3.14	0.955	27.00	1.00	26	28

Size frequency distribution of *Lottia gigantea* at Willows Anchorage Fall 2006

%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm	%80-89mm	%90-99mm	%≥100mm
17.65%	11.76%	35.29%	23.53%	5.88%	5.88%	0.00%	0.00%	0.00%	0.00%
0.00%	33.33%	16.67%	16.67%	16.67%	16.67%	0.00%	0.00%	0.00%	0.00%
0.00%	41.67%	33.33%	16.67%	8.33%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	9.09%	36.36%	36.36%	18.18%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

***Pisaster ochraceus* counts and size frequency histogram at Willows Anchorage, Fall 2006:**

TOTAL	187
count	67
min	35 mm
max	170 mm
mean	112 mm
stdv	37 mm



Black abalone, *Haliotis cracherodii*, at Willows Anchorage Fall 2006

Count Random	Count Sized	Mean Size	StDev	MinSize	MaxSize	%<45mm	%45-126mm	%127-145mm	%>145mm
26	26	75.69	20.56	45	112	-	100.00%	-	-

21 December, Revisit of Prisoners and Willows and transport to Ventura (Susie, Anna, Ken). Low tide -0.9 ft. at 1643 hrs. The sky was partly cloudy today, holding a little more eat in this evening. The wind was calm and seas were calm. Arrived on site at 1415 and left at 1715 getting back to the research station at 1845. Three black oystercatchers on the site tonight. Four oystercatchers were on the small island yesterday but none came to the site. There were about 20 western gulls on the beach on arrival. A squid light boat was in the anchorage and left about

1700 hrs. to join the 2 dozen or more squid boat offshore and to the east. The squid boats were working there yesterday too. A lobster boat anchored in the cove last night.

Dropped Susie, Anna, and Ken off at the pier before noon. They were going to see if they could count motiles in the last three plots at SCPH before the 1415 departure. Dan drove back to Willows Canyon to tag black abalone. PIT tags were applied to the shells of black abalone using as little z-spar epoxy as possible. Though only about the size of a kernel of long-grain rice, the tags seemed huge on small abalone. The resulting epoxy was about the size and shape of a fair sized limpet. A few more juveniles were found that were not seen on 12/20. The light was a little better when the search was begun and the swell was down considerably from the day before.

Dan attached the tags then went back with the reader and calipers. One was too far into a crack to read because the recorder couldn't get close enough. There was some difficulty when trying to read a tag within a tight cluster of abalone as the reader wanted to keep reading the same tag it just read. A total of 33 black abalone were tagged with sizes ranging from 45mm and 115 mm. There were 11 more that were measured but not tagged. There were two or three that either moved or simply could not be relocated from those found on 12/20. The smallest found was 25, another was 32mm. there was one (85mm) that was being eaten by a *Pisaster ochraceus* (about 110mm radius). It was trying to get away even though the hind portion of its mantle was digested. In looking for one of the tagged abalone (which this one wasn't) the *Pisaster* was pulled off the rock and it was discovered that the shell was already detached from the abalone. Two fresh shells were found (58, 67 mm). At least two abalone moved from where they were yesterday, both were larger animals (>100mm).

Excess epoxy was used to shore up bolts in M5. More tiny *Pisaster* in the 20mm range were found than we counted yesterday; probably a factor of not dodging waves and looking even closer for abalone in the crevices.

A black-shouldered kite was roosting in Christy Ranch fig tree. An adult bald eagle was seen at Prisoners Harbor on 12/17, about noon. Dozens of burrowing owls seen all over at night including down in Willow Canyon and out at the west end. Three fox and one skunk driving back to Christy from west end on 12/19. One fox driving back from west end on 12/18

22 December, Prisoners to Ventura (Dan). Low tide -0.9 ft. at 1724 hrs.

Dan returned to Ventura on the Friday IPCO boat following a PIT tagging effort for abalone the previous day at Willows. Sarah, Dirk and Paula had gone out to Scorpion for the day and accompanied him on the return trip in.

Santa Cruz Island January 03, 2007

(Database event #2006-F)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Anna Braswell, SCA Intern, CINP

PROCEDURE and general observations: We departed the park dock at approximately 0800 for a day trip aboard the *Sea Ranger II*. A group 14 botanists and volunteers were dropped by skiff at West Anacapa, to continue work on control of Cape Ivy. Brief visits to both East Anacapa pier and Scorpion Pier (Santa Cruz) were made to drop gear and/or park personnel before we motored to Orizaba Cove. Diane Brooks dropped us on-site just after 1200 by skiff, and we proceeded to score plots and take photos quickly as our time there was to be minimal. No motile invertebrate counts were made as they had been conducted in spring 2006. A timed search for sea stars was conducted for approximately 22 minutes. Total count was 303 sea stars. We departed the cove at approximately 1440, collecting the group at West Anacapa along the return trip. We arrived at the NPS dock about 1700.

03 January, Orizaba Cove. Low tide -1.4 ft. at 1607 hrs. Conditions were clear, wind less than 5 knots, no swell. Water temperature was 14°C. When we arrived, there were approximately 30 Black oystercatchers on Orizaba Rock, and many gulls and cormorants. One Black Turnstone and 3 harbor seals were also observed in the area. We were onsite 2.7 hours, from 1200 – 1440 hrs.

Photoplots were field-scored first, and then photographed. The diffuser screen was used for the photos because of the bright, sunny conditions. Pans from each of the reference bolts and other area photos were taken.

Hesperophycus was noticeably present and healthy. Large *Balanus* in the rockweed zone were noted. A very high prevalence of *Hesperophycus* was seen in the *Silvetia* zone plots. Heavy recruitment of *Mytilus* below the *Hesperophycus* plots and also in the *Tetraclita* and *Mytilus* plots. A patch of thick, dense *Mytilus* on the point was observed. Two mussel plots marker bolts (M3, M4) were completely obscured, although good approximate locations were found using previous plot photos. These plots had 100% cover of mussels.

Pisaster ochraceus were abundant (n=303 total), occurring mostly along the pools and crevices on the outer slope of the site. 100 were measured including many small recruits. Due to the boat schedule, we were not able to complete an entire 30-min seastar count. Susie counted measured 100 seastars starting near Hes1 (map C) plot working east towards mussels and barnacles areas (A & B) in 22 minutes. Anna counted 203 seastars from the mussel plots working west back around the point in 15 minutes. As a result of this joint effort, a complete search was made of the site. This may be considered a conservative count, however, as lower-occurring sea stars may have been uncounted; the tide was still outgoing at the time we left the site.

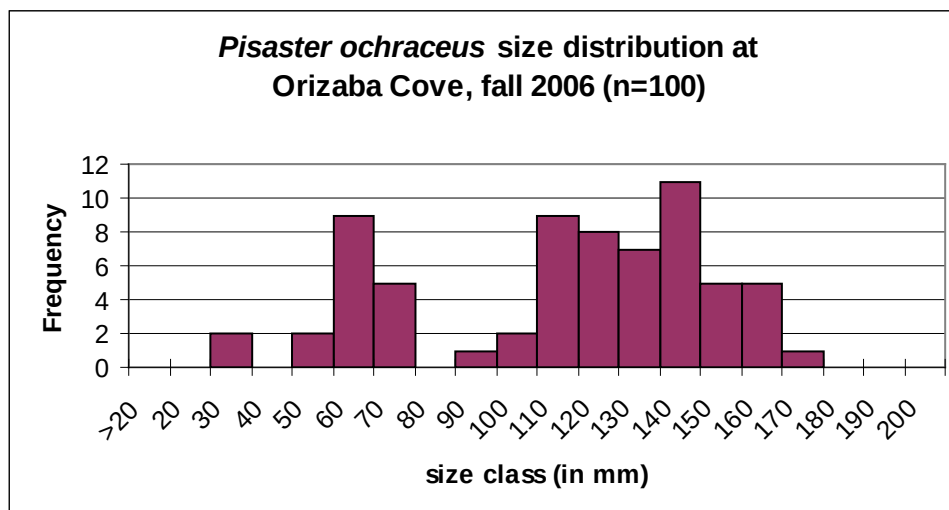
Photoplot summary – mean % cover by zone at Orizaba Cove, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	24.4	59.6	2.4	0.8	0.0	0.0	4.2
Endocladia	9.0	0.0	4.0	8.6	20.8	26.2	13.0
Silvetia (Rockweed)	4.6	0.0	3.4	0.0	0.0	0.0	80.6
Mytilus	13.4	0.0	17.8	0.0	0.0	0.2	64.2
Hesperophycus (Rockweed)	9.4	11.8	1.0	27.0	24.0	10.8	10.2

Zone	Turfweed	Leaf Barnacle	Misc. Algae	Misc. Animal	Tar
Barnacle	0.0	0.2	7.6	0.8	0.0
Endocladia	0.0	0.0	18.4	0.0	0.0
Silvetia (Rockweed)	0.0	0.4	10.0	1.0	0.0
Mytilus	0.0	0.2	2.6	1.6	0.0
Hesperophycus (Rockweed)	0.0	0.0	4.6	1.2	0.0

***Pisaster ochraceus* counts at Orizaba Cove, Fall 2006:**

TOTAL	303
count	100
min	25 mm
max	175 mm
mean	104 mm
stdv	46 mm



San Miguel Island January 16-20, 2007

(Database event #2006-G)

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Anna Braswell, SCA Intern, Channel Islands National Park
Ian Williams, Ranger, Channel Islands National Park (3 days)

PROCEDURE and general observations: Susie, Anna, and Ian Williams (island Ranger), along with Tessa Smith (fox technician), departed Camarillo airport at 1200 aboard CIA's *Islander* aircraft, stopping to pick up Dan on Santa Rosa Island (following his week-long tour to count snowy plovers). We arrived to San Miguel Island at approximately 1300, stashed our personal gear, and the three of us proceeded directly down to Cuyler Harbor for the first day of monitoring. Standard procedures were used at all rocky intertidal sites on San Miguel. Plots and site overviews/pans were photographed with the Olympus 5050-Z digital camera. The 'backup' camera was employed as we were still experiencing some failure with the primary camera. Field-scoring was completed for all photoplots at each site and included percent cover and motile invertebrate counts. Owl limpets were measured within five, fixed 1-m radius circular plots at Harris Point and Otter Harbor. None of the sites had surfgrass transects. *Pisaster ochraceus* were counted and measured at all sites except at Cuyler Harbor, when daylight ran short. A dedicated abalone search was performed at Crook Point and at Harris Point (across site and in fixed plots), or, in the case of Otter Harbor and Cuyler Harbor, occurred co-currently during a timed-search for sea stars. The maximum number of shorebirds and pinnipeds seen at any one time was recorded at each site.

16 January, Cuyler Harbor. Low tide -0.7 ft. at 1448 hrs. Conditions were clear and pleasant. Winds were calm although picked up to 10 mph by sunset. Surf was 1 – 2' and tide low enough to get by Middle Rocks on the way out, but not the way back. Beach level was eroded around rocks, and the old shipwreck was partially exposed. Water temperature was 13°C. Dan counted 26 willets and 3 whimbrels during our walk down Cuyler Beach; a peregrine falcon was seen soaring over east end of beach upon arrival. On the return walk, two snowy plovers were seen just as dusk fell. Numerous bull elephant seals, females and pups were hauled out down the length of the beach (estimated that 2/3rds of females had pups). Two black oystercatchers were seen on-site and 2 elephant seals were in the surge channel while we monitored. We were on-site from 1400 – 1730.

Mussels were large, and there were lots of large *Tetraclita* and some *Pollicipes* among mussels especially between plots 403 and 401. The large *Phragmatopoma* reef was mostly broken up but lots of smaller worm tubes still occurred around site. A few *Hesperophycus* plants were seen especially above plot 410, and *Silvetia* appeared lush. *Endocladia* was dense, although plots 414 & 415 retained a lot of sand in its tufts. Dense patches of larger-sized *Balanus* were observed. The brown alga, *Laminaria dentigera*, was common in the low intertidal.

Photoplot summary – mean percent cover by zone in fixed plots at Cuyler Harbor, San Miguel Island, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	24.4	46.4	0.0	27.4	0.0	0.8	0.2
Endocladia	27.0	5.4	0.0	29.2	0.0	11.2	9.4
Rockweed	17.6	0.0	2.0	2.4	0.0	62.4	0.4
Mussels	21.4	0.0	4.8	0.0	0.0	0.0	48.2

Zone	Leaf Barnacle	Misc Algae	Misc Animal
Barnacle	0.0	0.6	0.2
Endocladia	0.2	16.6	0.2
Rockweed	0.0	11.2	4.0
Mussels	2.0	9.4	9.0

Select motile invertebrate counts occurring within photoplots at Cuyler Harbor, San Miguel Island, Fall 2006

Zone	Barnacle					Endocladia					Silvetia				
plot #	416	417	418	419	420	411	412	413	414	415	406	407	408	409	410
<i>Lepidochitona</i> spp.						1	2				2	2	3	2	
<i>Nuttallina</i> spp.												1		1	
<i>Fissurella volcano</i>															
<i>Pachygrapsus crassipes</i>								1						2	1
<i>Pagurus</i> spp.											13	12		1	
large limpets (>10 mm)					2			1			2	6	2	4	1
<i>S. purpuratus</i>															
<i>Amphissa versicolor</i>										1					
<i>Nucella emarginata</i>	3	4	3	2	4		3	5	1	1	6	3	11	9	12
<i>Acanthina</i> spp.					2	1		3		1	3			2	1
<i>Tegula funebris</i>	5				5	10		22	1	20	37.5	16		6	
<i>Tegula gallina</i>							1								
<i>Mopalia</i> spp.															
<i>Ocenebra circumtexta</i>	3		1		2			2	1	1	6	1	2	5	4
<i>Lottia gigantea</i>						3									

Select motile invertebrate counts at Cuyler Harbor, San Miguel Island, Fall 2006

Zone	Mussel					
plot #	401	402	403	404	405	TOTALS
<i>Lepidochitona</i> spp.	3	1			1	17
<i>Nuttallina</i> spp.	12	2	1	17	9	43
<i>Fissurella volcano</i>						0
<i>Pachygrapsus crassipes</i>			1	1		6
<i>Pagurus</i> spp.		1			1	28
large limpets (>10 mm)		2			1	21
<i>S. purpuratus</i>						0
<i>Amphissa versicolor</i>						1
<i>Nucella emarginata</i>	2	18	13	6	12	118
<i>Acanthina</i> spp.						14
<i>Tegula funebris</i>						123
<i>Tegula gallina</i>						1
<i>Mopalia</i> spp.	1					1
<i>Ocenebra circumtexta</i>	1	1	1	2		33
<i>Lottia gigantea</i>	1	1	3	3	9	20

Calculated abundances by plot for *Littorina* spp., small (<5mm) and medium-sized (5-15 mm) limpets at Cuyler Harbor, San Miguel Island, Fall 2006 in Barnacle and Endocladia target zones. Note: organisms were sub-sampled if particularly abundant, in 3- 20x20cm or 10x10 cm quadrats, placed in upper left, middle, and lower right of the 50x75 cm fixed plot.

	Barnacle					Endocladia				
Plot #	416	417	418	419	420	411	412	413	414	415
<i>Littorina</i> spp.	688	1050	388	413	238	3	91	16	81	19
Limpet < 5 mm	6	25	25	6	9	3	3	9	22	0
Limpet 5-15 mm	9	16	28	13	16	28	22	19	31	25

Calculated abundances by plot for *Littorina* spp., small (<5mm) and medium-sized (5-15 mm) limpets at Cuyler Harbor, San Miguel Island, Fall 2006 in *Mytilus* and *Silvetia* target zones. Note: organisms were sub-sampled if particularly abundant, in 3- 20x20cm or 10x10 cm quadrats, placed in upper left, middle, and lower right of the 50x75 cm fixed plot. "Totals" is cumulative abundance across four target zones. *

	Mytilus					Silvetia					Totals
Plot #	401	402	403	404	405	406	407	408	409	410	
<i>Littorina</i> spp.	3	0	0	0	0	9	13	41	31	22	3103*
Limpet < 5 mm	59	9	28	19	28	6	3	9	9	28	309*
Limpet 5-15 mm	44	25	31	31	25	16	9	25	13	31	456*

Size distribution for selected motile invertebrates, with minimum/maximum and average size (in mm), summed across all 20 photoplots at Cuyler Harbor, San Miguel Island, Fall 2006. First ten of each encountered per plot are measured to nearest millimeter.

	<i>Nucella emarginata</i>	<i>Acanthina</i> <i>spp.</i>	<i>Tegula</i> <i>funnebralis</i>	<i>Ceratostoma</i> <i>nuttalli</i>	<i>Ocenebra</i> <i>circumtexta</i>	<i>Lottia</i> <i>gigantea</i>
count	105	14	67	0	32	20
avg size	14.42	12.14	18.25	0	10.47	30.9
min size	5	8	6	0	3	16
max size	25	19	30	0	16	45

Plot tags were in good condition, though #413 was found unreadable. Due to limited time, however, no repairs were made and no plot location photos were taken.

Numerous large *Pisaster* were seen, 149 in a 15-minute count, at the end of the day (1700 to 1715). Tide was coming up and dark setting in fast so the search was cut short. Abalone were also searched for during this time, but none were found.

Sea star (*Pisaster ochraceus*) counts* for 15-minute search, at Cuyler Harbor, San Miguel Island, Fall 2006:

SMCH	total
count	149

*No size-frequency data collected except numerous large (>150 mm) observed.

There are no *Lottia* plots at Cuyler Harbor.

17 January, Otter Harbor. Low tide -1.1 ft. at 1521 hrs. We had a morning hailstorm before leaving the bunkhouse. Rain had been intermittent since 0330 hrs. but we only had one real shower while hiking out to Otter Harbor via the Dry Lake Bed (Ian reported 0.04" on the rain gauge the following morning). Though cold early, conditions were quite pleasant by the afternoon. Wind was moderate and variable up to 10 mph, and swell was 2-3' with moderate surge. Water temperature measured 12.5°C. Three gulls, 8 Black oystercatchers, 1 American oystercatcher, 2 California sea lions, 8 harbor seals and 1 elephant seal were seen at the site. We were on-site from 1130 – 1600.

Dan scored all the photoplots, shot site/plot photos with Ian recording data, and proceeded with a combined 30-minute abalone/seastar count. Susie and Anna, with Ian's recording assistance, counted motiles in all photoplots and then measured owl limpets in all five fixed 1m² plots. Motile invertebrates were very abundant in plots and across site.

Mytilus cover was mediocre in plots (5 plots averaged 45.6%), and only one layer thick. *Balanus* and probably *Chthamalus* were very dense in areas but somewhat patchy. Plot 374 was all red algae (*M. affinis*, *C. canaliculatus*, coralline crust, *M. papillatus*). *Porphyra* sp. was present all over though mostly the thin small blades and probably not *P. perforata*. *Bangia* sp. was common on upper rocks. *Tigriopus californicus* were present in pools. One small *Aplysia californica* was seen. *Silvetia* was more common than one would guess from the photoplots. *Hesperophycus* was present though all was short-form (like at Harris Point) and difficult to distinguish from *Silvetia*.

Photoplot summary – mean percent cover by zone in fixed plots at Otter Harbor, San Miguel Island, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	15.8	38.0	0.0	0.0	0.0	0.0	0.0
Endocladia	21.6	4.2	1.0	44.2	0.2	7.4	1.0
Rockweed	25.8	29.2	0.0	21.2	0.0	10.6	0.0
Mussels	19.8	0.0	1.0	0.4	0.0	0.0	45.6

Zone	Leaf Barn	Misc Algae	Misc Animal
Barnacle	0.0	0.6	0.2
Endocladia	0.2	16.6	0.2
Rockweed	0.0	11.2	4.0
Mussels	5.0	9.4	9.0

Zone	Turf-weed	Misc. Algae	Misc. Animal	Tar
Barnacle	3.2	40.8	0.8	1.4
Endocladia	0.4	18.6	1.2	0.0
Rockweed	0.0	11.4	1.0	0.8
Mussels	1.6	24.6	2.0	0.0

Select motile invertebrate counts occurring within photoplots at Otter Harbor, San Miguel Island, Fall 2006

Zone	Barnacle					Endocladia					Silvetia				
plot #	370	371	372	373	374	360	361	362	363	364	355	356	357	358	359
<i>Lepidochitona</i> spp.						5	1	1	1	1					
<i>Nuttallina</i> spp.					1	2		2	1	2		1			
<i>Fissurella volcano</i>															
<i>Pachygrapsus crassipes</i>						3	1	1		1			1		
<i>Pagurus</i> spp.															
large limpets (>10 mm)					1	4	1	2	2	10	14	5	2	10	1
<i>S. purpuratus</i>															
<i>Amphissa versicolor</i>															
<i>Nucella emarginata</i>			1			8	1	1	1	1			1		2
<i>Acanthina</i> spp.					1		1								
<i>Tegula funebris</i>			1		91	14		1		3		6	1	3	1
<i>Tegula gallina</i>															
<i>Leptasterias</i> sp.															
<i>Ocenebra circumtexta</i>						2	2			1					
<i>Lottia gigantea</i>									1	1					

Select motile invertebrate counts at Otter Harbor, San Miguel Island, Fall 2006

Zone	Mussel					
plot #	375	376	378	379	380	TOTALS
<i>Lepidochitona</i> spp.	1	1		5	2	36
<i>Nuttallina</i> spp.	3	3	9	2	19	63
<i>Fissurella volcano</i>			1			1
<i>Pachygrapsus crassipes</i>	3	2	3	1		16
<i>Pagurus</i> spp.		2				2
large limpets (>10 mm)	2	3	1	3	2	63
<i>S. purpuratus</i>						0
<i>Amphissa versicolor</i>						0
<i>Nucella emarginata</i>	2	3	9	6	2	38
<i>Acanthina</i> spp.	1					3
<i>Tegula funebris</i>		2	2			125
<i>Tegula gallina</i>						0
<i>Leptasterias</i> sp.				1		1
<i>Ocenebra circumtexta</i>						5
<i>Lottia gigantea</i>	5	4	9	8	6	34

Calculated abundances by plot for *Littorina* spp., small (<5mm) and medium-sized (5-15 mm) limpets at Otter Harbor, San Miguel Island, Fall 2006 in Barnacle and Endocladia target zones. Note: organisms were sub-sampled if particularly abundant, in 3- 20x20cm or 10x10 cm quadrats, placed in upper left, middle, and lower right of the 50x75 cm fixed plot.

	Barnacle					Endocladia				
Plot #	416	417	418	419	420	411	412	413	414	415
<i>Littorina</i> spp.	688	1050	388	413	238	3	91	16	81	19
Limpet < 5 mm	6	25	25	6	9	3	3	9	22	0
Limpet 5-15 mm	9	16	28	13	16	28	22	19	31	25

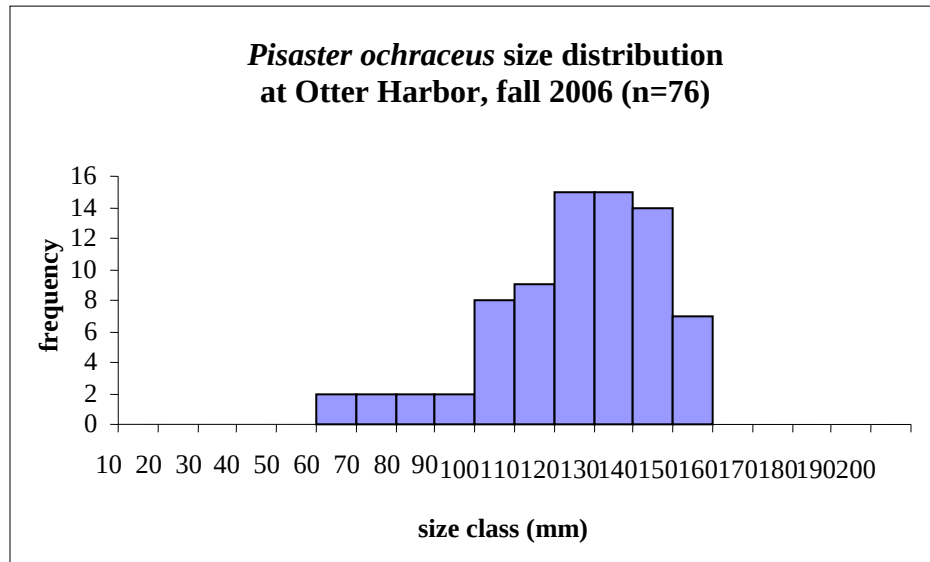
Calculated abundances by plot for *Littorina* spp., small (<5mm) and medium-sized (5-15 mm) limpets at Otter Harbor, San Miguel Island, Fall 2006 in Mytilus and Silvetia target zones. Note: organisms were sub-sampled if particularly abundant, in 3- 20x20cm or 10x10 cm quadrats, placed in upper left, middle, and lower right of the 50x75 cm fixed plot. Totals are cumulative abundance across four target zones.

	Mytilus					Silvetia					Totals
Plot #	401	402	403	404	405	406	407	408	409	410	
<i>Littorina</i> spp.	3					9	13	41	31	22	3103*
Limpet < 5 mm	59	9	28	19	28	6	3	9	9	28	309*
Limpet 5-15 mm	44	25	31	31	25	16	9	25	13	31	456*

Dan found 76 *Pisaster ochraceus*, ranging in size from 60-150 mm; there were also seven *P. gigantea* and one *Patiria miniata* found. One small black abalone in abalone (*Halotis*) plot 369 and an additional 63 black abalone were found in a random search between reference bolts. Dan did not take measurements for the black abalone he found because he anticipates going back out to this site next month to pit-tag abalone and will make that effort then. Sizes were estimated to range between 40 to 140 mm. (See Event B, 2007 report for details on abalone occurrence).

***Pisaster ochraceus* counts for 30-minute search, at Otter Harbor, San Miguel Island, Fall 2006**

<i>SMOH</i>	<i>total</i>
count	76
min size	60 mm
max size	150 mm
mean size	120 mm
stddev	22 mm



Black abalone (*Haliotis cracherodii*) counts for 30-minute search, at Otter Harbor, San Miguel Island, Fall 2006 (note only one abalone was sized):

<i>Count Random</i>	<i># in plots</i>	<i>Area</i>	<i>Density</i>	<i>Count Sized</i>	<i>Mean Size</i>	<i>St Dev</i>	<i>Min Size</i>	<i>Max Size</i>
63	1	6.800	0.147	1	60.00		60	60

A total of 187 owl limpets were counted and measured.

Owl limpet, *Lottia gigantea*, plot summary at Otter Harbor, San Miguel Island, Fall 2006

<i>Plot</i>	<i>Count Density</i>	<i>Area</i>	<i>Density</i>	<i>Count Sized</i>	<i>Mean Size</i>	<i>St Dev</i>	<i>Min Size</i>	<i>Max Size</i>
1	28	3.14	8.914	28	37.25	9.17	19	61
2	41	3.14	13.053	41	36.44	13.74	15	72
3	54	3.14	17.192	54	32.57	13.73	12	74
4	27	3.14	8.596	27	37.52	12.91	19	63
5	37	3.14	11.780	37	38.08	12.06	20	65

18 January, Harris Point. Low tide -1.3 ft. at 1555 hrs. Clear, wind from NW at 20 mph, swell 8-10'. Tar balls were seen floating in the surge channel but no apparent fresh tar on rocks. Water temperature was 13°C. Seven black oystercatchers, 1 California sea lion, 4 harbor seals, and 1 elephant seal were at the site. 18 black oystercatchers were observed at Secret Cove. The pinnipeds commenced hauling-out just after our arrival but did not stay after seeing us. We were on-site from 1106 – 1730.

We had to wait until just after noon before *Balanus* plots were not awash to start sampling. Ian recorded again for Susie and Anna for motiles, *Lottia* plots and photos. Dan scored percent cover and then measured abalone (10 total) and sea stars (10 *P. ochraceus*, 1 *P. giganteus*, 5 *Patiria miniata*).

Dense patches of large *Balanus* were observed; *Endocladia* was also fairly thick. *Hesperophycus* was very healthy but the short-form plants just don't form dense canopies as the more typical form does. *Mytilus* were only dense in one plot and was one layer deep across most of site. *Ocenebra* sp. were large. Many small *Lepidochitona* spp. *Mopalia* spp. was common, as was *Lottia gigantea* in plots. *Nuttallina* sp. was common as well. Susie found a *Nucella emarginata* (common in plots) eating the head of a small limpet.

Photoplot summary – mean percent cover by target zone in fixed plots at Harris Point, San Miguel Island, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	18.6	74.0	0.0	5.2	0.6	0.0	0.0
Endocladia	20.8	11.2	0.2	39.4	14.8	0.0	3.2
Mussels	19.6	0.0	1.4	4.8	1.0	0.0	39.8
Tetraclita	16.4	1.4	7.0	6.6	0.0	0.2	20.2
Hesperophycus (Rockweed)	14.4	0.0	0.0	28.2	51.8	0.0	0.2

Zone	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other
Barnacle	0.0	0.0	0.2	0.4	1.0	0.0
Endocladia	0.6	0.0	9.2	0.6	0.0	0.0
Mussels	0.8	0.4	31.2	1.0	0.0	0.0
Tetraclita	7.0	0.2	38.6	2.4	0.0	0.0
Hesperophycus (Rockweed)	0.4	0.0	4.6	0.4	0.0	0.0

Select motile invertebrate counts occurring within photoplots at Harris Point, San Miguel Island, Fall 2006

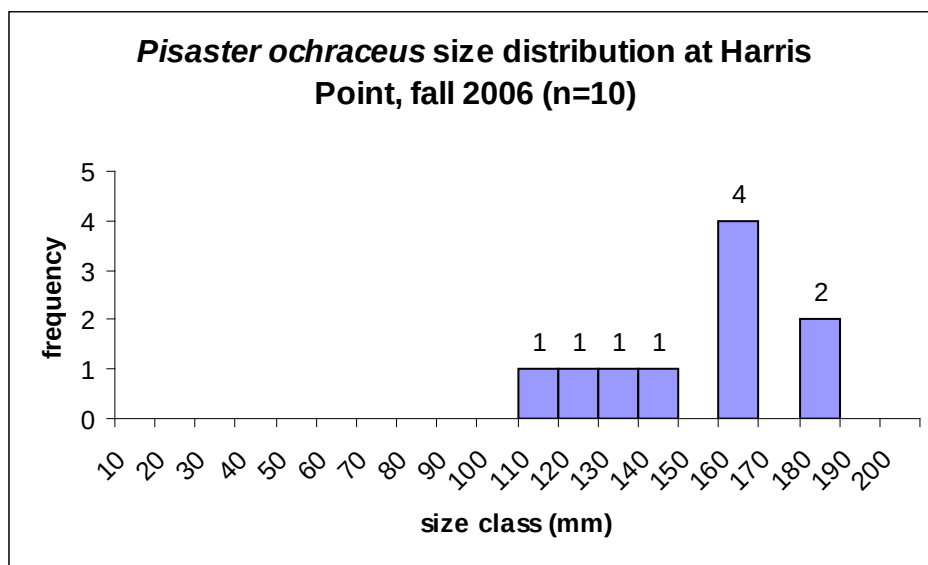
Zone	Barnacle					Endocladia					Hesperophycus				
plot #	440	441	442	443	444	431	432	433	434	435	421	422	423	424	425
<i>Lepidochitona</i> spp.								1						1	
<i>Nuttallina</i> spp.										1					
<i>Fissurella volcano</i>															
<i>Pachygrapsus crassipes</i>						1				1	2	1			
<i>Pagurus</i> spp.						1									10
large limpets (>10 mm)											4	1			
<i>S. purpuratus</i>															
<i>Amphissa versicolor</i>															
<i>Nucella emarginata</i>	7		3			5	10	2		1	2	3	4		1
<i>Acanthina</i> spp.															
<i>Tegula funebris</i>						2									
<i>Tegula gallina</i>															
<i>Leptasterias</i> sp.															
<i>Ocenebra circumtexta</i>	2		1			9	10								
<i>Lottia gigantea</i>															

Zone	Mussel					Tetraclita					
plot #	426	427	428	429	430	436	437	438	439	445	TOTALS
<i>Lepidochitona</i> spp.	2	2				5			1	2	14
<i>Nuttallina</i> spp.	1			1	1	10	29	2	2	8	56
<i>Fissurella volcano</i>											0
<i>Pachygrapsus crassipes</i>	1			4	3	2		2		1	18
<i>Pagurus</i> spp.		4	20						9		44
large limpets (>10 mm)	2			1	1	1				1	11
<i>S. purpuratus</i>				1	1						2
<i>Amphissa versicolor</i>											0
<i>Nucella emarginata</i>						19	11			12	80
<i>Acanthina</i> spp.											0
<i>Tegula funebris</i>								2			4
<i>Tegula gallina</i>											0
<i>Leptasterias</i> sp.								5	3		8
<i>Ocenebra circumtexta</i>		8	1	2	4	2					39
<i>Lottia gigantea</i>	2			1		7	17			12	39

A total of 10 *Pisaster ochraceus* were measured within the site. One *Pisaster gigantea* (120 mm) and 5 *Patiria miniata* (50, 50, 60, 30, 20 mm) were also measured.

***Pisaster ochraceus* counts for 30-minute search, at Harris Point, San Miguel Island, Fall 2006**

Total Count	Total
count	10
min size	110 mm
max size	180 mm
mean size	
stddev	



Haliotis cracherodii, was also measured during the timed-search for sea stars. There was one abalone in plot 443, no abalone in the others. A total of ten (10) abalone were found within the site. In the main crevice, there were 3 abalone and only 1 large *Pisaster*.

***Haliotis cracherodii* counts from a 30-minute search at Harris Point, San Miguel Island, Fall 2006:**

Count Random	# in plots	Area	Density	Count Sized	Mean Size	St Dev	Min Size	Max Size
9	1	2.500	0.400	10	124.10	19.67	80	151

Lottia plot (L1) is mostly covered by algae and only two *L. gigantea* were found. A total of 174 *Lottia gigantea* measured in the five plots combined. Photoplots also had numerous *Lottia*.

***Lottia gigantea* plot summary at Harris Point, San Miguel Island, Fall 2006**

Plot	Count Density	Area	Density	Count Sized	Mean Size	St Dev	Min Size	Max Size
1	2	3.14	0.637	2	39.50	0.71	39	40
2	18	3.14	5.731	18	48.00	16.07	21	75
3	60	3.14	19.102	60	37.25	8.91	20	61
4	65	3.14	20.694	65	30.14	7.21	15	43
5	30	3.14	9.551	30	53.00	13.13	25	74

Susie made numerous repairs to plot markers. *Endocladia* plots: 432, lower left; 433, upper right. 434 (atop the rock), upper left and right repaired. Due to a sheared rock edge, number tag was placed in upper right (with back to ocean); *Mytilus* plot: 429, lower left. *Tetraclita* plots: 436, lower right repaired; *Balanus/Chthamalus* plot: 440, a vertical orientated plot, number is in upper right with back facing ocean. Rockweed plots: 422, upper left, number redone, although may be hard to read as epoxy was marked while submerged in small pool. This marker may need to be repaired again.

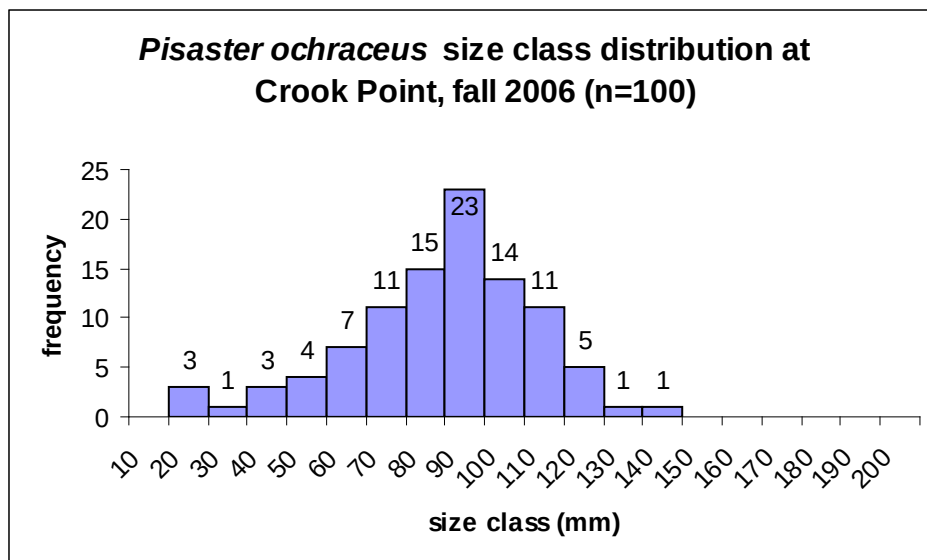
We were just finished with sampling before dark. We hiked back to bunkhouse arriving at 1900.

19 January, Crook Point. Low tide -1.3 ft. at 1629 hrs. Clear, cool and breezy. Swell was low, 1-2', wind moderate at 10 mph out of west. Water temperature measured 13°C. Sand level was moderate, but with low scour and rock movement. Three Brandt's cormorants, 3 western gulls, 6 black oystercatchers, 1 American oystercatcher, 3 Black turnstones, and 4 elephant seals were at the site. Elephant seals were observed on all surrounding beaches w/ pups. One harbor seal was seen off eastern beach at our departure. We were on-site from 1130 – 1630.

We departed bunkhouse at approx. 1000, following service of camera, and labeling of photos from yesterday. When we arrived on site, three large male elephant seals were on upper rocks but we were able to get by without disturbing them. Dan scored all the plots, while Susie, Anna and Ian, recording, scored motile invertebrates. Susie made a few plot repairs, as Dan, Anna and Ian shot photos.

Susie then measured sea stars in a 30-minute search, measuring 100 with Anna recording part way through. Dan felt sea stars were more abundant and Susie conducted a second, thorough search of the upper bench from the surge channel to the northern end of the large pool (n=93). Sea stars were dispersed in distribution; they were mostly medium-sized (75-150mm) and cryptic in color, blending in amongst small isolated pools and mussels, so it was possible counts were off. From 1520 – 1600, Dan searched abalone plots along with the entire abalone monitoring area atop reef, measuring 22 abalone. There were none in plots but one each just outside plots 391, and 393. Most of the abalone were singles, but one cluster of 6 and a couple of pairs were within a half meter of each other. There were a fair number of *S. purpuratus* losing their spines – all size classes seemed to be affected. Overall, only approx.1% of the urchins observed appeared affected; urchins were very numerous throughout site.

Size frequency histogram for *Pisaster ochraceus*, measured at Crook Point, San Miguel Island, Fall 2006



***Haliotis cracherodii* counts for a dedicated 30-minute search, at Crook Point, San Miguel Island, Fall 2006:**

Count Random	# in plots	Area	Density	Count Sized	Mean Size	St Dev	Min Size	Max Size
22	0		0.000	22	109.00	23.06	47	138

On the outer reef, there were many small *Pollicipes*. All sizes of *Mytilus* were present with some quite large on the outer reef. Dense clusters on the inner reef. Sipunculids still present amongst mussels on inner reef. Colonial tunicates and orange sponges appeared common. *Leptasterias* were also common. *Silvetia* and *Hesperophycus* looked very similar and one may have been confused for the other. Motile invertebrates, except for littorines, were remarkably low in abundance. Littorines -not localized in one zone - were common in all plots, and abundant in many. *Nucella* were few, though medium-sized (~15 mm) when found (one large; measuring 29 mm), and *Acanthina* entirely absent. The chiton, *Fissurella volcano*, also entirely absent. Tight clusters of mussels and fouling of valves by algae mats may have made conditions undesirable for snails. However, *Nuttallina* and large limpets abundant in one of the mussel plots(385) is worth commenting. *Pachygrapsus* crabs were present, though they also appeared to be small-sized and not particularly common.

Repair to number tag of 389 (UR) was made and a few markers were reinforced with the extra epoxy.

Photoplot summary – mean % cover by zone in fixed plots at Crook Point, San Miguel Island, Fall 2006 (5 plots/zone):

Zone	Bare Rock	Barn	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels
Barnacle	44.6	47.2	0.0	6.6	0.0	0.0	0.8
Endocladia	38.4	5.8	0.8	21.2	5.8	4.0	11.6
Rockweed	30.2	5.0	0.2	13.2	3.6	0.4	29.8
Mussels	12.2	0.2	0.8	0.0	0.0	0.0	77.0

Zone	Turfweed	Leaf Barn	Misc Algae	Misc Animal
Barnacle	0.0	0.0	0.6	0.2
Endocladia	0.0	0.8	10.4	1.2
Rockweed	2.4	0.8	13.8	0.6
Mussels	0.2	0.6	8.4	0.6

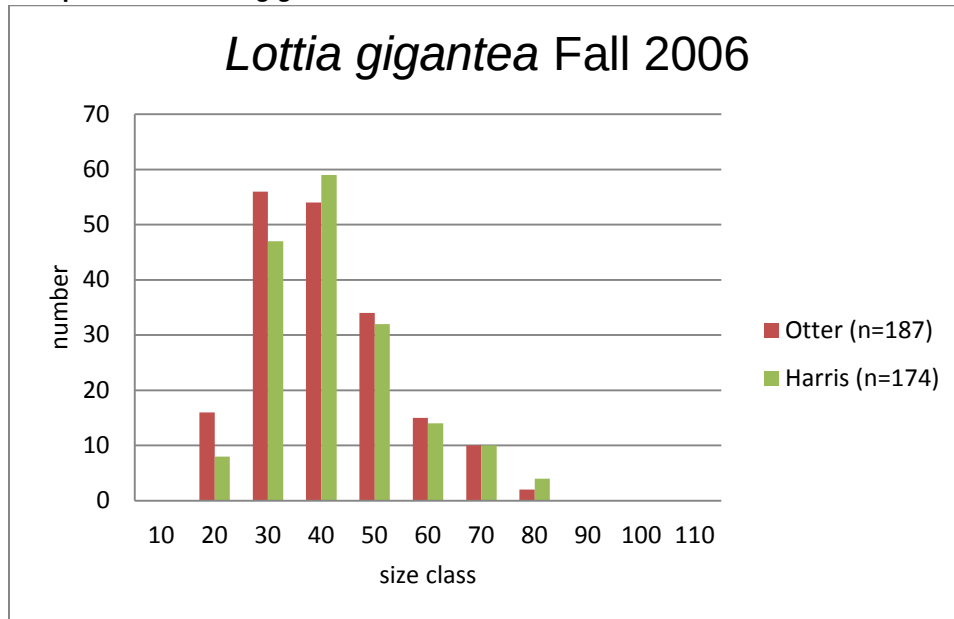
Select motile invertebrate counts occurring within photoplots at Crook Point, San Miguel Island, Fall 2006:

Zone	Barnacle					Endocladia					Silvetia				
plot #	137	147	148	149	150	386	387	388	389	390	396	397	398	399	400
<i>Lepidochitona</i> spp.									2						
<i>Nuttallina</i> spp.									2						
<i>Fissurella volcano</i>															
<i>Pachygrapsus crassipes</i>									1		3				
<i>Pagurus</i> spp.															
large limpets (>10 mm)									1					1	
<i>S. purpuratus</i>															
<i>Amphissa versicolor</i>															
<i>Nucella emarginata</i>				1					6						
<i>Acanthina</i> spp.															
<i>Tegula funebris</i>									1		1	1		3	
<i>Tegula gallina</i>															
<i>Leptasterias</i> sp.															
<i>Ocenebra circumtexta</i>	3	0	1		0										
<i>Lottia gigantea</i>						33									

Zone	Mussel					
plot #	381	382	383	384	385	TOTALS
<i>Lepidochitona</i> spp.					1	3
<i>Nuttallina</i> spp.	3			3	11	19
<i>Fissurella volcano</i>						0
<i>Pachygrapsus crassipes</i>				4		8
<i>Pagurus</i> spp.						0
large limpets (>10 mm)						2
<i>S. purpuratus</i>	1			4	9	14
<i>Amphissa versicolor</i>						0
<i>Nucella emarginata</i>	3					10
<i>Acanthina</i> spp.						0
<i>Tegula funebris</i>		4	18		20	48
<i>Tegula gallina</i>						0
<i>Leptasterias</i> sp.				1	1	2
<i>Ocenebra circumtexta</i>						0
<i>Lottia gigantea</i>	1			2	2	5

There are no *Lottia* plots at Crook Point.

Comparison of *Lottia gigantea* size distribution between two sites located on San Miguel Island, Fall 2006:



Appendix D. Motile Invertebrate Data Tables and Figures

Motile invertebrate species sampled in fixed photoquadrats are listed in Table D-1. Included are species and group codes along with corresponding species and group names. Site identification codes and corresponding site names are also included.

Mean and standard error values are presented in Table D-2 for select motile invertebrate species in each sampling zone at all sites and both sampling seasons (spring and fall). All species were sampled within the entire area (50 x 75 cm) of photoquadrats except for LSMALL, LMDALL and *Littorina* spp. which were subsampled in three locations within photoquadrats each measuring either 10 x 10 cm or 20 x 20 cm (subsampling count data are extrapolated to the full 50 x 75 cm photoplot area). The three limpet categories (LIMPLG, LMDALL, and LSMALL) included all species of limpets.

Figures D-1 through D-5 represent size distributions for dominant motile invertebrate species. Maximum of 10 individuals from each genera were collected for sizing. Refer to Table D-1 for site codenames. Figure D-6 includes graphs of species mean abundances for 2009 at each site along with the overall, maximum, and minimum means of combined previous years.

Table D1. Site, Species, and Group Codes with Definitions

Site ID	Island	Site	Species/ Group Code	Scientific Name/ Description
SMOH	San Miguel	Otter Harbor	LEPSPP	<i>Lepidochitona</i> spp.
SMCH	San Miguel	Cuyler Harbor	NUTSPP	<i>Nuttallina</i> spp.
SMCP	San Miguel	Crook Point	FISVOL	<i>Fissurella volcano</i>
SRFR	Santa Rosa	Fossil Reef	PACCRA	<i>Pachygrapsus crassipes</i>
SRNWT	Santa Rosa	NW-Talcott	PAGSPP	<i>Pagurus</i> spp.
SREP	Santa Rosa	East Point	OCESPP	<i>Ocenebra</i> spp.
SRFP	Santa Rosa	Ford Point	LIMPLG	limpets over 15 mm in size on any substrate/organism
SRJL	Santa Rosa	Johnson's Lee	NUCEMA	<i>Nucella emarginata/ostrina</i>
SCTR	Santa Cruz	Trailer	TEGFUN	<i>Tegula funebris</i> (<i>Chlorostoma funebris</i>)
SCFC	Santa Cruz	Fraser Cove	TEGGAL	<i>Tegula gallina</i> (<i>Chlorostoma gallina</i>)
SCOC	Santa Cruz	Orizaba Cove	LOTGIG	<i>Lottia gigantea</i>
SCPH	Santa Cruz	Prisoner's Harbor	LSMALL	limpets under 5 mm in size on all substrate
SCSR	Santa Cruz	Scorpion Rock	LMDALL	limpets 5-15 mm in size on all substrate
SCWA	Santa Cruz	Willows Anchorage	LITSPP	<i>Littorina</i> spp.
ANCR	Anacapa	Cat Rock	PISOCH	<i>Pisaster ochraceus</i>
ANMW	Anacapa	Middle-West	STRPUR	<i>Strongylocentrotus purpuratus</i>
ANME	Anacapa	Middle-East		
ANSFC	Anacapa	S Frenchy's Cove		
SBLC	Santa Barbara	Landing Cove		
SBSLR	Santa Barbara	Sea Lion Rookery		

SiteID	Sampling SeasonCode	TargetZone	Plots Sampled	LESPPP	NUTSPP	MOPSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR	
ANSFC			5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	16.9	710.0	0.0	0.0	
ANSFC		e	5	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	4.3	24.5	0.0	0.0	
ANSFC			5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0				0.0	0.0	
ANSFC		j	5	3.8	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.2	0.8	0.2	0.0	0.2	1.3	21.9	10.6	0.0	0.0	
ANSFC Mean				1.40	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.07	0.27	0.07	0.00	0.07	1.73	14.36	248.37	0.00	0.00	
ANSFC SE				0.54	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.03	0.12	0.03	0.00	0.03	0.22	2.33	103.24	0.00	0.00	
SMOH			5	0.0	0.2	0.0	0.0	0.2	0.0	0.0	6.4	0.6	0.0	2.2	0.0	0.0	21.9	23.1	205.6	0.0	0.0	
SMOH			5	1.8	1.4	0.0	0.0	1.2	0.0	0.2	3.8	2.4	0.2	3.6	0.0	1.2	21.3	65.0	45.6	0.0	0.0	
SMOH			5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	18.4	0.0	0.0	17.5	32.5	346.7	0.0	0.0	
SMOH			5	2.6	7.2	0.0	0.2	1.8	0.4	0.0	2.2	4.4	0.2	0.8	0.0	6.4	36.3	137.5	1.3	0.0	0.0	
SMOH Mean				1.10	2.25	0.00	0.05	0.80	0.10	0.05	3.15	1.90	0.15	6.25	0.00	1.90	24.22	64.53	149.79	0.00	0.00	
SMOH SE				0.29	0.75	0.00	0.02	0.19	0.04	0.02	0.59	0.43	0.02	1.83	0.00	0.68	1.84	11.59	35.30	0.00	0.00	
SMHP			5	0.2	0.0	0.0	0.0	0.6	2.0	1.0	1.0	2.0	0.0	0.2	0.0	0.0	5.0	10.6	287.5	0.0	0.0	
SMHP			5	2.6	0.6	0.0	0.0	1.6	4.8	0.0	0.8	12.0	0.0	0.0	0.0	0.6	62.5	48.1	68.1	0.0	0.4	
SMHP			5	0.2	0.2	0.0	0.0	0.4	0.2	3.8	0.0	3.6	0.0	0.4	0.0	0.0	19.4	42.5	243.8	0.0	0.0	
SMHP			5	1.6	10.2	0.0	0.0	1.0	1.8	4.8	0.4	9.4	0.0	0.4	0.0	7.2	40.6	48.8	11.9	0.0	0.0	
SMHP			5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	2.0	0.0	0.0	0.0	0.0	1.9	15.0	845.0	0.0	0.0	
SMHP Mean				0.92	2.20	0.00	0.00	0.72	1.76	2.04	0.44	5.80	0.00	0.20	0.00	1.56	25.88	33.00	291.25	0.00	0.08	
SMHP SE				0.23	0.90	0.00	0.00	0.12	0.39	0.42	0.09	0.92	0.00	0.04	0.00	0.63	5.11	3.73	66.09	0.00	0.04	
SMCH			5	1.0	8.2	0.2	0.0	0.4	0.4	1.0	0.6	10.2	0.6	0.0	0.0	3.4	28.8	31.3	0.6	0.0	0.0	
SMCH			5	1.8	0.4	0.0	0.0	0.6	5.2	3.6	3.0	8.2	0.8	11.9	0.0	0.0	11.3	18.8	23.1	0.0	0.0	
SMCH			5	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.2	2.0	1.0	10.6	0.0	0.6	7.5	25.0	41.9	0.0	0.0	
SMCH			5	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.4	3.2	0.4	2.0	0.0	0.0	14.4	16.3	555.0	0.0	0.0	
SMCH Mean				0.85	2.15	0.05	0.00	0.30	1.40	1.35	1.05	5.90	0.70	6.13	0.00	1.00	15.47	22.81	155.16	0.00	0.00	
SMCH SE				0.17	0.90	0.02	0.00	0.06	0.57	0.35	0.29	0.88	0.06	1.34	0.00	0.36	2.08	1.50	59.72	0.00	0.00	
SMCP				5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	26.9	35.0	2352. 5	0.0	0.0

SiteID	Sampling SeasonCode	TargetZone	Plots Sampled	LEPSPP	NUTSPP	MOPSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR	
SMCP				5	0.2	3.4	0.0	0.0	1.4	0.0	0.0	0.0	3.0	0.0	4.6	0.0	1.0	36.3	58.1	51.3	0.0	2.8
SMCP				5	0.6	0.4	0.0	0.0	0.2	0.0	0.0	0.2	1.2	0.0	0.2	0.0	0.0	257.5	106.3	360.0	0.0	0.0
SMCP				5	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.2	1.2	0.0	1.0	0.0	0.0	66.3	58.8	275.0	0.0	0.0
SMCP Mean					0.20	0.95	0.00	0.00	0.55	0.00	0.00	0.10	1.40	0.00	1.45	0.00	0.25	96.72	64.53	759.6 9	0.00	0.70
SMCP SE					0.06	0.37	0.00	0.00	0.14	0.00	0.00	0.03	0.26	0.00	0.48	0.00	0.11	24.26	6.69	239.2 2	0.00	0.31
SRFR				5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.2	0.0	40.6	42.5	1215. 0	0.0	0.0
SRFR				5	1.6	0.0	0.0	0.0	0.6	0.2	0.4	0.0	0.2	7.6	15.8	0.0	0.0	153.8	39.4	881.9	0.0	0.0
SRFR				5	3.0	0.2	0.0	0.0	2.2	0.4	0.6	0.6	0.0	5.6	74.8	0.0	0.0	71.3	41.9	366.9	0.0	0.0
SRFR				5	1.2	26.2	0.0	0.6	2.0	0.4	0.0	0.4	3.4	0.0	0.0	0.0	1.6	101.9	45.0	8.1	0.0	2.2
SRFR Mean					1.45	6.60	0.00	0.15	1.20	0.25	0.25	0.25	0.90	3.45	22.69	0.05	0.40	91.88	42.19	617.9 7	0.00	0.55
SRFR SE					0.28	2.92	0.00	0.07	0.24	0.04	0.07	0.07	0.37	0.84	7.94	0.02	0.18	10.79	0.52	119.7 9	0.00	0.25
SRNWT				5	0.0	4.4	0.0	3.6	3.2	0.0	3.2	0.4	2.0	0.0	0.0	0.0	3.4	24.4	50.4	1.9	0.0	0.0
SRNWT				5	0.0	0.0	1.6	0.2	1.0	0.2	0.8	0.6	0.0	0.6	2.4	0.0	0.4	67.5	66.9	0.0	0.0	0.0
SRNWT				5	6.0	0.0	0.0	0.2	0.8	0.0	0.2	1.2	0.0	0.8	3.8	0.0	0.0	28.1	58.1	410.0	0.0	0.0
SRNWT				5	6.2	0.4	0.0	0.0	0.4	0.0	0.0	2.6	0.0	1.0	3.0	0.0	0.0	23.7	29.3	2.5	0.0	0.0
SRNWT Mean					3.05	1.20	0.40	1.00	1.35	0.05	1.05	1.20	0.50	0.60	2.30	0.00	0.95	35.93	51.16	103.5 9	0.00	0.00
SRNWT SE					0.79	0.48	0.18	0.39	0.28	0.02	0.33	0.22	0.22	0.10	0.37	0.00	0.37	4.73	3.60	45.68	0.00	0.00
SREP				5	0.6	0.2	0.0	0.0	2.4	1.6	4.0	0.2	1.0	17.6	8.0	0.0	0.0	68.1	23.8	935.0	0.0	0.0
SREP				5	1.4	0.2	0.0	0.2	1.2	2.8	0.0	0.4	1.4	4.4	15.2	0.0	0.0	48.1	15.0	2412. 5	0.0	0.0
SREP				5	1.2	0.4	0.0	0.0	1.6	0.4	0.4	0.0	0.8	14.2	4.2	0.0	0.0	80.0	21.3	623.1	0.0	0.0
SREP				5	12.8	1.4	0.0	0.0	2.6	3.2	1.8	0.2	4.0	16.8	52.6	0.0	0.0	48.1	15.0	52.5	0.0	0.0
SREP				5	0.8	3.4	0.0	0.4	5.8	0.0	1.0	0.6	1.6	0.0	0.0	0.0	0.0	138.8	75.6	6.3	1.2	0.0
SREP Mean					3.36	1.12	0.00	0.12	2.72	1.60	1.44	0.28	1.76	10.60	16.00	0.00	0.00	76.63	30.13	805.8 8	0.24	0.00
SREP SE					1.06	0.27	0.00	0.04	0.36	0.28	0.32	0.05	0.26	1.58	4.24	0.00	0.00	7.46	5.15	195.9 2	0.11	0.00
SRFP	FA06	barn- acle		5	0.8	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	127.5	73.1	1000. 6	0.0	0.0
SRFP				5	1.8	3.6	0.0	0.0	1.2	0.0	0.0	0.2	5.0	0.6	1.4	0.0	0.2	318.1	116.9	181.3	0.0	1.4
SRFP				5	0.6	1.0	0.0	0.0	0.6	0.0	0.6	0.4	3.6	0.0	1.4	0.0	0.6	102.5	87.5	28.8	0.4	0.4

SiteID	Sampling SeasonCode	TargetZone	Plots Sampled	LEPSPP	NUTSPP	MOPSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR	
SRFP Mean					1.07	1.53	0.00	0.00	0.67	0.00	0.20	0.27	2.93	0.20	0.93	0.00	0.27	182.7 1	92.50	403.5 4	0.13	0.60
SRFP SE					0.17	0.48	0.00	0.00	0.13	0.00	0.09	0.03	0.64	0.09	0.21	0.00	0.08	30.45	5.76	134.9 6	0.06	0.19
SRJL				5	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.3	1.8	0.0	0.0	162.5	139.1	1212. 5	0.0	0.0
SRJL				5	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.8	0.0	0.0	0.3	160.2	157.8	150.0	0.0	0.0
SRJL				5	0.7	0.0	0.0	0.0	2.7	2.7	0.7	0.3	0.0	0.0	0.7	0.0	0.0	47.9	63.5	10.4	0.0	0.0
SRJL Mean					0.39	0.08	0.00	0.00	1.31	0.89	0.22	0.11	0.42	0.33	0.81	0.00	0.08	123.5 2	120.1 4	457.6 4	0.00	0.00
SRJL SE					0.09	0.04	0.00	0.00	0.32	0.40	0.10	0.05	0.13	0.10	0.23	0.00	0.04	16.91	12.88	169.7 5	0.00	0.00
SCTR				5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	112.5	111.3	1140. 0	0.0	0.0
SCTR				6	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	6.0	12.0	0.0	0.0	25.0	21.3	186.3	0.0	0.0
SCTR				5	0.0	9.8	0.0	1.6	2.2	0.0	0.8	0.4	8.2	0.2	0.2	0.0	0.4	45.0	24.4	0.6	0.0	0.4
SCTR				5	3.0	0.0	0.0	0.0	0.4	0.8	0.6	3.0	0.4	6.4	177.8	0.0	0.0	28.1	26.3	8.1	0.0	0.2
SCTR Mean					1.55	2.45	0.00	0.40	0.65	0.20	0.35	1.00	2.50	3.15	47.50	0.00	0.10	52.66	45.78	333.7 5	0.00	0.15
SCTR SE					0.39	1.07	0.00	0.17	0.23	0.09	0.09	0.30	0.83	0.77	19.00	0.00	0.04	8.91	9.53	118.7 8	0.00	0.04
SCFC				5	0.4	0.0	0.0	0.0	0.2	0.6	0.2	0.0	0.6	0.4	7.0	0.2	0.0	5.6	14.4	46.9	0.0	0.0
SCFC				5	0.6	0.2	0.0	0.0	0.8	0.0	0.2	0.4	2.0	2.2	2.8	0.0	0.0	40.6	38.1	17.5	0.0	0.0
SCFC				5	0.2	0.0	0.0	0.0	0.0	2.0	0.0	0.0	1.4	5.2	17.8	0.0	0.0	28.1	21.3	21.9	0.0	0.0
SCFC				5	0.0	0.2	0.0	0.2	0.4	0.2	0.0	0.0	3.2	1.0	7.2	0.2	0.0	38.1	49.4	1.3	0.0	0.0
SCFC				5	0.8	0.0	0.0	0.0	0.4	0.6	0.8	0.8	0.6	7.0	20.6	0.0	0.0	38.8	27.5	4.4	0.0	0.0
SCFC				5	0.8	3.0	0.0	0.0	0.2	0.0	0.0	0.2	10.6	0.8	0.2	0.0	0.0	81.3	45.6	1.3	0.0	0.0
SCFC				5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	156.9	0.0	0.0
SCFC Mean					0.40	0.49	0.00	0.03	0.29	0.49	0.17	0.20	2.63	2.37	7.95	0.06	0.00	33.30	28.13	35.71	0.00	0.00
SCFC SE					0.06	0.19	0.00	0.01	0.05	0.12	0.05	0.05	0.62	0.45	1.40	0.02	0.00	4.51	2.97	9.43	0.00	0.00
SCPH				5	0.0	0.2	0.0	0.0	0.0	0.0	0.6	0.0	4.0	5.4	0.0	0.0	0.0	42.9	42.3	257.0	0.0	0.0
SCPH				5	1.0	0.0	0.0	0.0	1.0	0.2	5.0	0.0	1.0	12.0	4.0	0.0	0.0	26.9	28.8	273.1	0.0	0.0
SCPH				5	0.0	0.4	0.0	0.0	0.2	0.0	2.4	0.2	1.2	4.6	1.0	0.0	0.0	19.4	33.1	788.8	0.0	0.0
SCPH				5	0.0	0.4	0.0	6.8	1.8	0.6	7.2	0.2	10.6	15.2	0.0	0.0	0.0	7.5	10.0	0.6	0.0	0.0
SCPH				5	2.4	0.8	0.0	0.0	0.2	0.0	4.2	2.6	7.4	6.4	2.0	0.0	0.2	70.0	96.9	157.5	0.0	0.0

SiteID	Sampling SeasonCode	TargetZone	Plots Sampled	LESPPP	NUTSPP	MOPSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR		
SCPH Mean					0.68	0.36	0.00	1.36	0.64	0.16	3.88	0.60	4.84	8.72	1.40	0.00	0.04	33.33	42.20	295.4 0	0.00	0.00	
SCPH SE					0.21	0.06	0.00	0.61	0.15	0.05	0.50	0.22	0.83	0.93	0.33	0.00	0.02	4.84	6.55	59.27	0.00	0.00	
SCWA					5	2.0	0.2	0.0	0.0	0.2	0.0	0.0	7.2	0.0	0.0	0.0	0.0	9.4	6.9	410.0	0.0	0.0	
SCWA					5	3.4	0.0	0.0	0.0	1.0	15.0	0.0	0.8	2.6	7.0	4.0	0.0	0.0	56.3	41.3	220.0	0.0	0.0
SCWA					5	0.0	0.4	0.0	1.0	3.0	0.0	0.2	8.2	0.0	0.0	0.0	0.2	75.6	36.3	0.0	0.0	3.4	
SCWA					5	2.8	2.2	0.0	0.0	0.4	8.2	2.4	3.2	2.4	11.8	0.0	0.0	0.0	145.6	30.6	10.0	0.0	0.0
SCWA Mean					2.05	0.70	0.00	0.25	1.15	5.80	0.65	1.05	5.10	4.70	1.00	0.00	0.05	71.72	28.75	160.0 0	0.00	0.85	
SCWA SE					0.33	0.23	0.00	0.11	0.29	1.62	0.26	0.33	0.68	1.29	0.45	0.00	0.02	12.65	3.40	43.63	0.00	0.38	
ANCR					9	1.7	0.8	0.0	0.5	2.0	0.2	1.7	0.7	0.0	1.0	0.0	0.0	30.5	6.2	89.0	0.0	0.0	
ANCR					9	2.6	9.8	0.0	2.7	2.6	0.0	2.1	0.9	0.0	0.7	0.0	0.7	44.8	7.8	8.3	0.0	0.0	
ANCR					9	0.8	0.0	0.0	0.0	1.3	0.0	0.0	0.0	3.5	0.0	0.0	0.0	28.1	5.7	113.0	0.0	0.0	
ANCR					9	0.7	13.9	0.0	1.3	1.1	0.0	3.7	0.0	0.0	0.0	0.0	3.1	59.4	23.4	1.6	0.0	0.0	
ANCR Mean					1.44	6.12	0.00	1.11	1.76	0.04	1.87	0.39	0.00	1.29	0.00	0.00	0.95	40.70	10.80	52.98	0.00	0.00	
ANCR SE					0.14	1.13	0.00	0.19	0.11	0.01	0.25	0.08	0.00	0.25	0.00	0.00	0.25	2.41	1.41	9.40	0.00	0.00	
ANMW					5	1.8	3.0	0.0	0.0	5.6	0.6	3.8	1.2	4.0	6.6	0.0	0.0	0.2	26.0	15.0	10.0	0.0	0.0
ANMW					5	1.0	2.2	0.0	2.0	3.8	0.0	2.0	1.4	1.8	5.0	0.0	0.0	0.8	32.0	23.3	0.6	0.0	0.0
ANMW					5	0.6	5.0	0.0	0.4	4.0	2.2	5.2	0.6	4.4	14.0	0.0	0.0	0.4	73.8	21.3	9.4	0.0	0.0
ANMW					5	1.4	2.0	0.0	2.0	2.6	0.0	9.0	2.0	7.4	4.6	0.0	0.0	0.0	40.0	51.9	0.0	0.0	0.2
ANMW Mean					1.20	3.05	0.00	1.10	4.00	0.70	4.99	1.30	4.40	7.55	0.00	0.00	0.35	42.93	27.84	4.99	0.00	0.05	
ANMW SE					0.12	0.31	0.00	0.24	0.28	0.23	0.67	0.13	0.52	0.98	0.00	0.00	0.08	4.77	3.67	1.21	0.00	0.02	
ANSFC					5	0.2	0.2	0.0	0.0	0.4	0.0	0.4	0.0	0.4	0.4	0.0	0.0	0.0	5.2	0.6	7.2	0.0	0.0
ANSFC					5	0.2	1.8	0.0	1.2	2.6	0.0	1.2	0.0	9.6	3.0	0.0	0.0	0.0	91.9	28.8	0.0	0.0	0.0
ANSFC					5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.4	1.2	0.2	0.0	0.0	24.4	8.1	191.3	0.0	0.0
ANSFC					5	0.8	0.4	0.0	0.2	0.6	0.0	0.2	0.6	0.4	2.6	0.4	0.0	0.0	22.5	21.9	1.9	0.0	0.0
ANSFC Mean					0.30	0.60	0.00	0.35	1.15	0.00	0.45	0.15	2.70	1.80	0.15	0.00	0.00	35.99	14.84	50.09	0.00	0.00	
ANSFC SE					0.08	0.18	0.00	0.13	0.22	0.00	0.12	0.07	1.03	0.27	0.04	0.00	0.00	8.55	2.86	21.05	0.00	0.00	
SBLC					5	0.4	0.4	0.0	0.0	0.6	1.2	0.0	2.4	0.0	6.8	0.2	0.2	0.0	0.6	35.6	1.4	0.0	0.0

SiteID	Sampling SeasonCode	TargetZone	Plots Sampled	LEPSPP	NUTSPP	MOPSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR	
SBLC				5	2.6	2.6	0.0	0.0	0.2	0.0	8.2	0.0	0.0	0.0	0.0	0.0	121.3	20.6	55.0	0.0	0.0	
SBLC				5	0.0	0.0	0.0	1.3	1.0	0.3	0.8	0.0	0.0	0.5	0.0	0.0	1.0	2.3	0.0	0.0	0.0	
SBLC				5	0.4	4.2	0.0	1.2	1.0	0.0	9.2	0.0	0.0	0.0	0.0	1.4	63.1	91.3	0.0	0.0	0.6	
SBLC Mean					0.85	1.80	0.00	0.61	0.70	0.36	4.54	0.60	0.00	1.83	0.05	0.05	0.35	46.50	37.44	14.10	0.00	0.15
SBLC SE					0.26	0.44	0.00	0.16	0.09	0.13	1.08	0.27	0.00	0.74	0.02	0.02	0.16	12.93	8.58	6.10	0.00	0.07
SBSLR				5	2.0	1.4	0.0	0.2	1.2	21.8	3.6	1.2	0.0	1.8	0.0	0.0	2.2	19.3	35.2	6.0	0.0	0.0
SBSLR				5	0.6	0.4	0.0	0.0	0.2	0.0	0.8	1.6	0.0	0.0	0.0	0.0	0.2	8.4	7.0	10.4	0.0	0.0
SBSLR				5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	3.8	511.3	0.0	0.0
SBSLR				5	0.0	0.0	0.0	7.2	0.6	0.2	3.0	0.2	0.0	0.0	0.0	0.0	0.0	41.9	66.9	0.6	0.0	0.2
SBSLR Mean					0.65	0.45	0.00	1.85	0.50	5.50	1.85	0.75	0.00	0.45	0.00	0.00	0.65	17.55	28.21	132.0 7	0.00	0.05
SBSLR SE					0.21	0.15	0.00	0.80	0.12	2.43	0.39	0.17	0.00	0.20	0.00	0.00	0.23	4.01	6.57	56.53	0.00	0.02