



Rocky Intertidal Community Monitoring at Channel Islands National Park

2007 Annual Report

Natural Resource Data Series NPS/CHIS/NRDS—2012/400



ON THE COVER

Rocky intertidal zone at Crook Point, San Miguel Island
Photograph by: Dan Richards

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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 (CINP) includes the five northern islands off the coast of southern California and the surrounding waters out one nautical mile. Approximately 176 miles of coastline surround the islands; 80% of which is composed of rock. The diverse and undisturbed nature of the tidepools of this rocky coastline was recognized as a special feature of the islands in the enabling legislation. To conserve these communities unimpaired for future generations, the NPS has been monitoring the rocky intertidal communities at the islands since 1982. Sites were established between 1982 and 1994 using judgment sampling and considering visitation, accessibility, presence of representative organisms, wildlife disturbance, and safety. This report summarizes the 2007 sampling year efforts (from March 2007 to January 2008) and findings of the 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 were met by monitoring percent cover of core species in target intertidal zones using photo-plots and transects, monitoring species composition and abundance of motile invertebrates using photo-plots, and measuring size frequency and abundance of black abalone, owl limpets, and sea stars using fixed plots or timed searches.

Thirteen key species or assemblages are monitored twice per year at 21 sites on the five park islands (Figure 1) as part of the Rocky Intertidal Monitoring Program. Fixed photoplots were 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.), leaf 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 seastars (*Pisaster ochraceus*) are determined using timed searches. Shorebirds and pinnipeds are counted at each site. Visitor numbers for the Anacapa tidepools reported by the concession boats are presented here.

During the 2007 sampling season, we monitored all 21 sites at least once. Eighteen sites were monitored in spring; 15 in fall. The two sites at Santa Barbara Island were only monitored in fall to avoid disturbing nesting California brown pelicans. Weather conditions were favorable for sampling during most trips. Abalone and sea star searches were limited during several site visits due to large waves.

The mean percent cover of most targeted species in 2007 was comparable to combined means of previous years in spring but fell markedly below average during fall, particularly for the rockweed *Silvetia compressa* (Figures 5-7). *S. compressa* mean cover decreased below long-term averages at nine out of 14 sites where the rockweed was sampled in spring. In fall, 10 sites had below average *S. compressa* cover and only one site had comparable levels to previous years. *Mytilus californianus*, declined at approximately one-third of sites in spring and half of all sites in fall compared with past years. Mussel cover was markedly higher in spring than earlier years

at five of 18 sites. *Endocladia muricata* cover remained comparable to long-term averages at six sites and above average at seven of 19 sites sampled in spring, but fell below average at nearly 60 percent of sites in fall. Barnacle, *Chthamalus dalli/fissus* and *Balanus glandula*, cover remained comparable to the combined mean of previous years at nearly half of sites in spring and fall. In spring, above average abundances of barnacles were also measured at approximately half of sites. Other core species such as *Hesperophycus californicus* and *Tetraclita rubescens* predominantly decreased below or remained comparable to the long-term mean cover for each taxon.

One abalone, *Haliotis cracherodii*, was found in a fixed monitoring plot at Harris Point in both spring and fall. In fall, one abalone was found in fixed plots at Crook Point and at Otter Harbor. Abalone were not found inside any other fixed plots during spring or fall. Only three sites had more than 10 *H. cracherodii* located during timed or site-wide searches in spring. Small *H. cracherodii* (< 50 mm) were uncommon at most sites and mean sizes were greater than 80 mm at all islands except Anacapa and Santa Cruz, indicating low recruitment overall. No abalone exhibiting symptoms of Withering Syndrome were found in 2007. Black abalone population levels at the islands still remain less than one percent of 1985 population levels (Richards 1988, Richards and Davis 1993).

Ochre sea stars, *Pisaster ochraceus*, were moderately abundant at most sites in 2007 compared with previous years. More than 500 *P. ochraceus* (record high counts) were observed in 30 minute timed-counts at four sites. Sea Lion Rookery had nearly eight times as many *P. ochraceus* as any previous sample. The mean size-distribution of *P. ochraceus* populations ranged 58-122 mm across sites.

Giant owl limpet, *Lottia gigantea*, densities were comparable to initial densities in 2007 at all but four sites. Densities ranged from a mean of 2.5 m⁻² at Santa Cruz Island to 7.3 m⁻² at San Miguel Island. Mean shell lengths of *L. gigantea* in 2007 varied greatly among islands, sites, and plots. The largest owl limpets were observed at Trailer (mean = 73.3 mm) and the smallest were measured at Cat Rock (mean = 35.8 mm).

Surfgrasses, *Phyllospadix* spp., were monitored in fixed transects at four sites. All three transects at both Santa Cruz Island sites experienced declines, some marked (5-50 %). Surfgrass densities on all but one transect at the two Santa Rosa Island sites have remained relatively stable over the years including 2007. Cover on Transect-3 at Northwest Talcott displayed a decreasing trend in surfgrass abundance throughout the year.

As in previous years, black oystercatchers were the most common shorebird and were seen at nearly all sites throughout the year. American oystercatcher sightings have become more frequent during the past several years. One to two individuals were seen at several sites during both seasons. Alternatively, black turnstones have increasingly become less common since the 1980s. In 2007, only two to four black turnstones were seen at three sites in spring and two sites in fall. Western gulls were seen at nearly half the sites sampled in spring. Flocks of 60 and 18 cormorants were observed at East Point and Cuyler Harbor, respectively. Brown pelicans were only present at East Point.

Harbor seals, *Phoca vitulina*, were observed within the immediate vicinity of eight sites in spring and 5 sites in fall, 2007. Northern elephant seal, *Mirounga angustirostris*, abundance was comparable during both monitoring seasons; ten individuals were observed each season though presence only occurred at two sites in spring and five sites in fall. California sea lions, *Zalophus californianus*, were only present at the aptly-named site, Sea Lion Rookery and Anacapa Middle-West. This year approximately 300 individuals including juveniles and adults were observed at Sea Lion Rookery. Two sea lions were seen at Anacapa Middle-West.

South Frenchy's Cove is the most visited rocky intertidal area at the park, due to its close proximity to the mainland and relative ease of access. In 2007, Island Packers Company ran 13 trips to Frenchy's Cove, Anacapa to visit the tidepools. Total visitation was 1,151 passengers. Most visitors (76%) accessed South Frenchy's Cove during the months of March through April with March being the busiest month (668 visitors).

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 (four days in spring and three 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 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.

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List of Acronyms

<i>Acronym</i>	<i>Description</i>
ANI	Anacapa Island
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
MLLW	Mean Lower Low Water
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
SCI	Santa Cruz Island
SMCA	State Marine Conservation Area
SMI	San Miguel Island
SMR	State Marine Reserve
SRI	Santa Rosa Island
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 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. In fact, many organisms are so well adapted to this habitat that they cannot live without the alternating exposure to both air and sea.

Channel Islands National Park (CINP) and National Marine Sanctuary (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 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 Channel Islands National Park. 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 photo-plots and transects, monitoring species composition and abundance of motile invertebrates using photo-plots, and measuring size frequency and abundance of black abalone, owl limpets, and sea stars 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. Sampling site locations for this monitoring effort were chosen subjectively based on the location of target organisms. This sampling design was selected in an attempt to maximize our ability to detect changes in species distribution and abundance. Because intertidal areas are so heterogeneous, an impractically large number of plots would be necessary to detect temporal changes in species abundance using probability-based sampling (Ambrose et al. 2002, 1995b). The disadvantage of this sampling design is that results from plots cannot be extrapolated to the larger, non-sampled population (Engle 2008).

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 2008). 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 2007 sampling year efforts (from March 2007 to January 2008) 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.

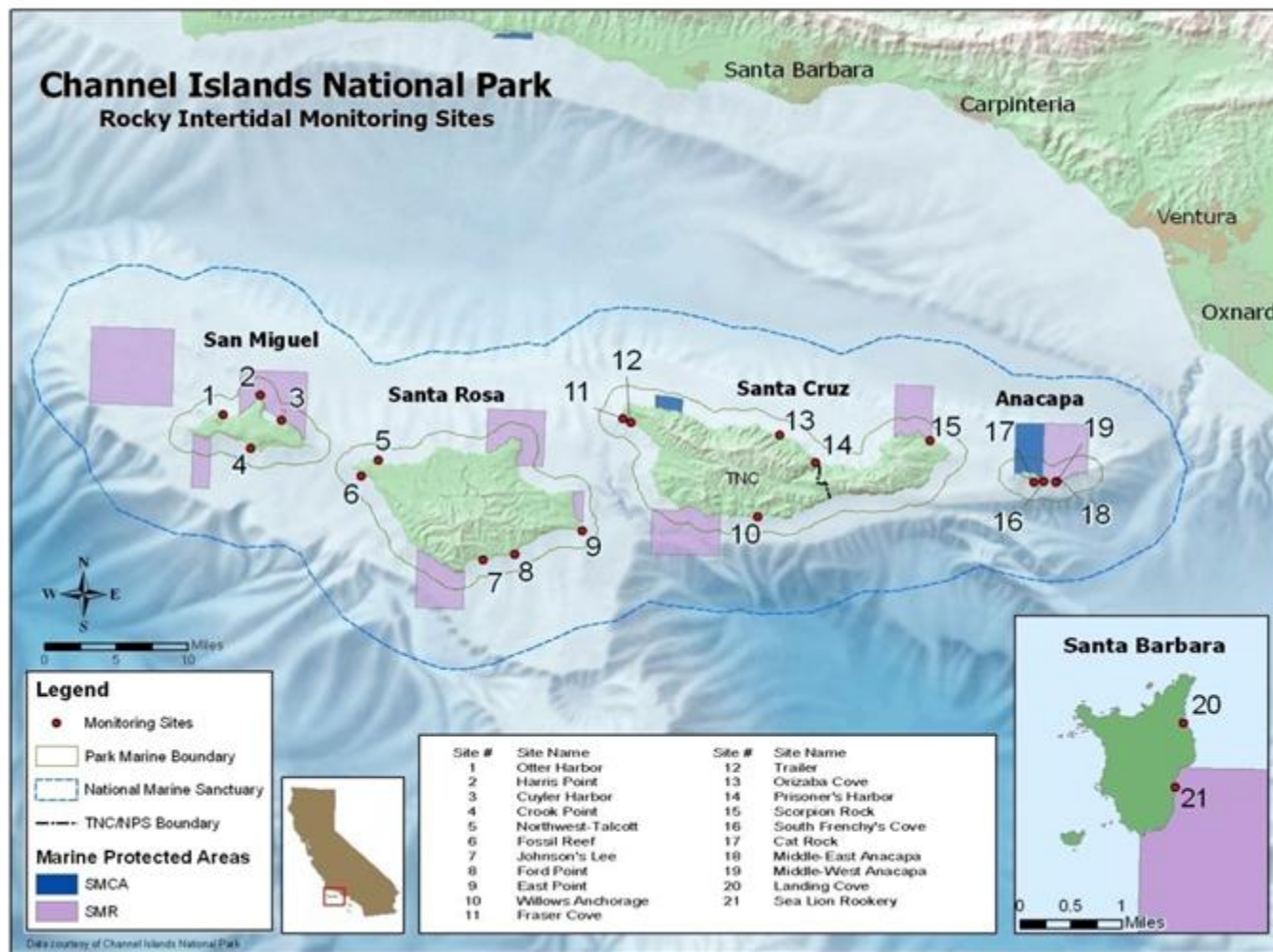


Figure 1. Rocky Intertidal Community Monitoring Site Locations in Channel Islands National Park. Note: TNC= The Nature Conservancy, SMCA= State Marine Conservation Area, SMR= State Marine Reserve, Sites 18 and 19 are on adjacent reefs.

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 2007.

(Target species are shown in bold.)	Photo-plots	Surfgrass Transects	Circular Plots	Abalone/Sea star	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/Pterocladia capillacea</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 (continued). 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 2007 (continued).

(Target species are shown in bold.)	Photo-plots	Surfgrass Transects	Circular Plots	Abalone/Sea star	Motile Inverts
MOLLUSCS					
<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>Chlorostoma funebris</i> (= <i>Tegula funebris</i>)					X
<i>Chlorostoma gallina</i> (= <i>Tegula gallina</i>)					X
<i>Chlorostoma</i> spp. (= <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> (Acorn Barnacle)	X				
<i>Tetraclita rubescens</i> (Thatched Barnacle)	X				
<i>Pollicipes polymerus</i> (Leaf 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			
SUBSTRATA					
Rock (Bare Rock)	X	X			
Sand	X	X			
Tar	X	X			
UNDETERMINED					
Unidentified (cannot tell if plant, invert or substratum)	X	X			
* The specific definitions of these categories are different for photo-plots compared to transects.					

Monitoring

The CINP Rocky Intertidal Monitoring Program has 21 sites on the five park islands (Figure 1) that were established between 1982 and 1994. Sites generally consist of an array of 15-35 photoplots, 3-5 irregular and circular plots used to monitor black abalone and owl limpet densities, respectively, and *P. ochraceus* transects. Four sites have three surfgrass transects. Site selection considered visitation, accessibility, presence of representative organisms, wildlife disturbance, and safety. Sampling is usually conducted twice each year, once in spring and fall. In 2007, sites were monitored in spring (March-May) and fall (October-January 2008). 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). Also see Engle (2008) for updated MARINE protocols. See Appendix A for additional notes about the 2009 program.

Data are maintained in Microsoft Access databases and Excel files in the Channel Islands National Park network and MARINE. The 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 substrate. 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 2007, 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 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.

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.



Figure 2. Scoring photo-plots. Dan Richards at Ford Point, Santa Rosa Island.

Relative abundance and size structure were collected for black abalone (*Haliotis cracherodii*), giant owl limpets (*Lottia gigantea*), and ochre sea stars (*Pisaster ochraceus*). *H. cracherodii* 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. *L. gigantea* were measured within fixed-circular plots of one-meter radius (3 to 5 plots per site) (Figure 3). *P. ochraceus* 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 time and condition allow, 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.



Figure 3. Measuring *Lottia gigantea* in a fixed-circular plot. Dan Richards at Otter Harbor, San Miguel Island.

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 (Engle 2008). 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 (Engle 2008).



Figure 4. Surfgrass transect #1 at East Point, Santa Rosa Island.

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 and Susie Tharratt 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.

Taxonomy and nomenclature follow Smith and Carlton (1975), Abbott and Hollenberg (1976), McLean (1978), Morris et al. (1980), and <http://ucjeps.berkeley.edu/californiaseaweeds.html>.

Data Analysis

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*], leaf 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 to be representative of a larger area. Surfgrass trends were plotted for temporal reference.

Photo-plots, 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.

Results and Discussion

Photo-plots

Photo-plot data are summarized in figures 5-7 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).

The mean percent cover of most targeted species in 2007 was comparable to combined means of previous years in spring but fell markedly below average during fall, particularly the rockweed *Silvetia compressa* (Figures 5-7). *S. compressa* mean cover decreased below long-term averages at nine out of 14 sites where rockweed was sampled in spring. In fall, 10 sites had below average *S. compressa* cover and only one site (Cuyler Harbor) had comparable levels to previous years. *Mytilus californianus*, declined at approximately one-third of sites in spring and half of all sites in fall compared with past years. Mussel cover was markedly higher in spring than earlier years at five of 18 sites. *Endocladia muricata* cover remained comparable to long-term averages at six sites and above average at seven of 19 sites sampled in spring, but fell below average at nearly 60 percent of sites in fall. Barnacle, *Chthamalus dalli/fissus* and *Balanus glandula*, cover remained comparable to the combined mean of previous years at nearly half of sites in spring and fall. In spring, above average abundances of barnacles were also measured at approximately half of sites. Other core species such as *Hesperophycus californicus* and *Tetraclita rubescens* predominantly decreased below or remained comparable to the long-term mean cover for each taxon.

Red algal turf, composed of *Gelidium* sp., *Pterocladia* sp. and *Chondracanthus canaliculatus*, is only monitored at Landing Cove. This algal assemblage is typically very stable and usually dominates the lower intertidal zone at most sites. At Landing Cove, it is conspicuous in three out of five plots in that zone, yet the surfgrass, *Phyllospadix torreyi*, has increasingly become more dominant in two of the plots over the past several years (Figure 7). In 2007, red algal turf abundance fell markedly below the long-term mean, and was replaced primarily by surfgrass.

Pollicipes polymerus zone plots have only been established at Fraser Cove. There, *P. polymerus* cover declined slowly over time from a high in 1996 of approximately 25 percent to a low of 5.4 percent in fall 2007 (Figure 7).

Tetraclita rubescens is monitored at three sites. Below average cover was measured at Orizaba Cove both seasons (Figure 7). At Harris Point and Scorpion Rock, *T. rubescens* cover was comparable to the long-term mean in fall, but cover increased above average in spring at Harris Point.

Tar is monitored at Fraser Cove where it is naturally deposited from seeps in the Santa Barbara Channel onto extensive substrata in the upper intertidal. Tar cover was comparable to the long-term mean (Figure 7).

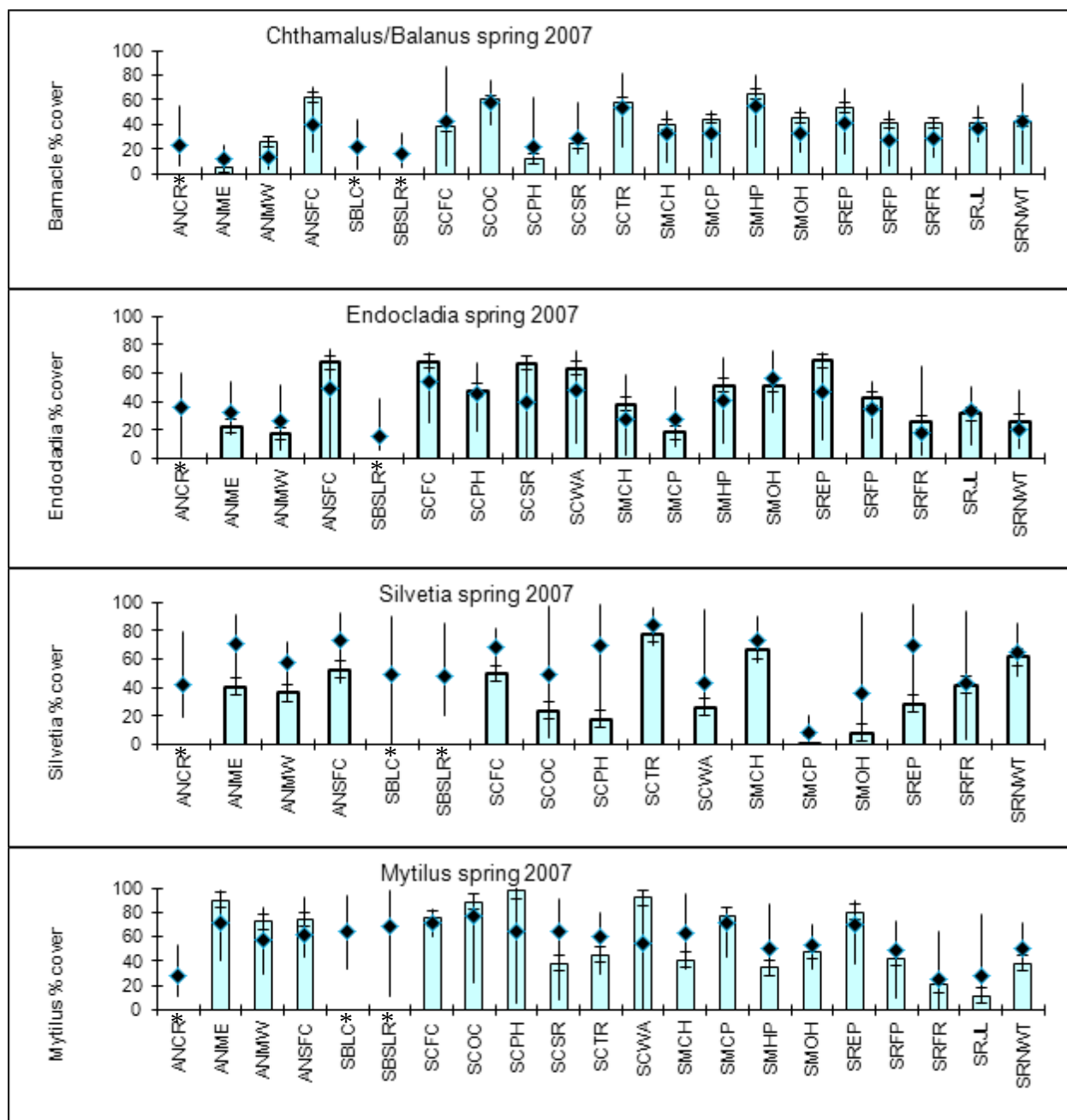


Figure 5. Percent cover of target species (*Chthamalus/Balanus*, *Endocladia muricata*, *Silvetia compressa*, and *Mytilus californianus*) in fixed plots by zone in spring 2007. Bars represent the seasonal mean percent cover from five plots within that zone; error bars represent ± 1 standard error of 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 10 for site codes. (* denotes sites that were not sampled).

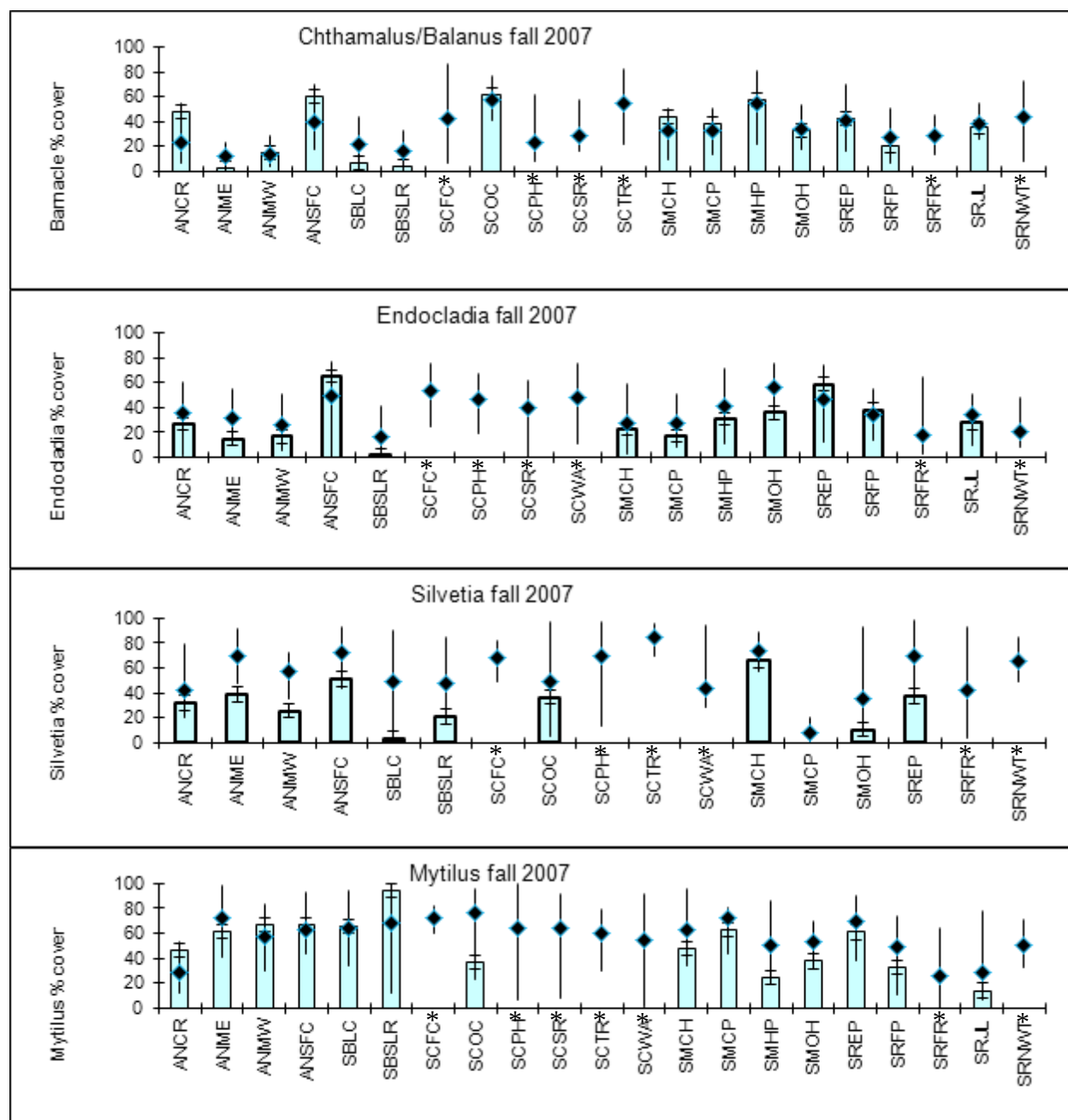


Figure 6. Percent cover of target species (*Chthamalus/Balanus*, *Endocladia muricata*, *Silvetia compressa*, and *Mytilus californianus*) in fixed plots by zone in fall 2007. Bars represent the seasonal mean percent cover from five plots within that zone; error bars represent ± 1 standard error of the 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 10 for site codes. (* denotes sites that were not sampled).

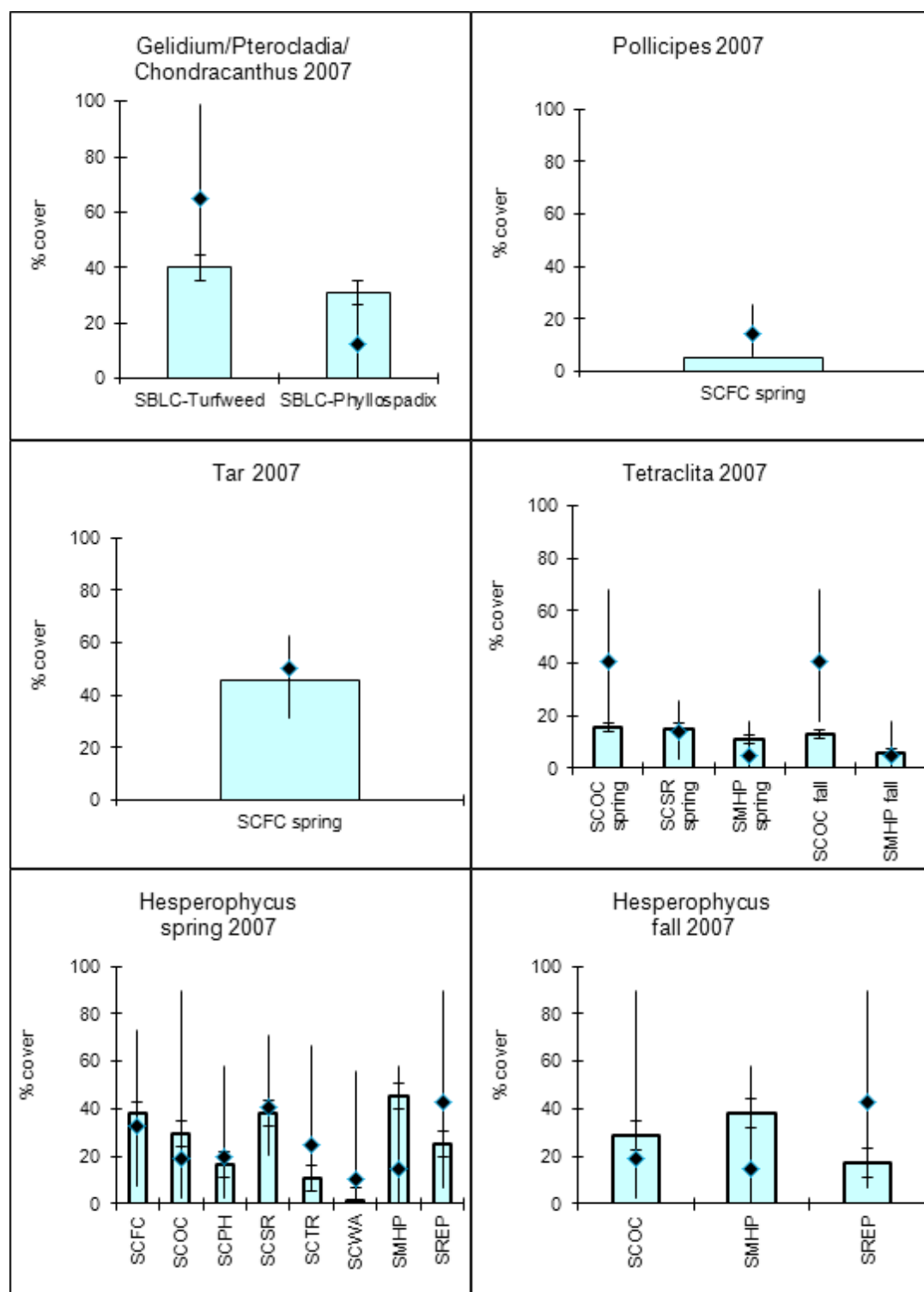


Figure 7. Percent cover of target taxa (Red algal turf, Tar, *Tetraclita rubescens*, *Pollicipes polymerus*, and *Hesperophycus californicus*) in fixed plots by zone in 2007. Bars represent the seasonal mean percent cover from five plots within that zone; error bars represent ± 1 standard error of the 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 10 for site codes.

Motile Invertebrates

The densities of motile invertebrate species have been sampled since 2000 at most sites. Over time, the abundances of most species have varied markedly. In 2007, abundances were again highly variable among species and sites (see Appendix D). Exceptionally high or low densities were measured at many sites for nearly all species.

In general, barnacle and *Endocladia* plots tended to be populated primarily by littorine snails, *Littorina* spp., small (<5 mm) and medium-sized (5-15 mm) limpets with only minimal occurrences of some other sampled motile invertebrate taxa (see Appendix D). The barnacle zone had the greatest number of *Littorina* spp. (mean = 820.2/ plot) compared with other zones. *Silvetia* plots had more turban snails, *Tegula funebris* (mean = 12.3/ plot), and chitons, *Lepidochitona* spp. (mean = 2.0/ plot), than plots from other zones. The second highest numbers of littorine snails and *T. funebris* were measured in the other type of rockweed zone, *Hesperophycus*. *Hesperophycus* plots also were characterized as having the least number of small limpets (mean = 13.5/ plot). *Mytilus* plots had more predatory dogwinkle snails, *Nucella emarginata* (mean = 7.1/ plot), and shore crabs, *Pachygrapsus crassipes* (mean = 2.7/ plot), than other types of plots and the second greatest numbers of chitons, *Nuttallina* spp., and small and medium-sized limpets; latter taxa were most abundant in the *Tetraclita* zone.

Temporally at each site, *Lepidochitona* spp. were more numerous in plots at five of the nineteen sites than any previous sampling season (see Appendix D). Other chiton species, *Nuttallina* spp. and *Mopalia* spp. were also more abundant in 2007 than earlier years at two sites. *T. funebris* and *Littorina* spp. both reached record-high densities at one site.

Substantial decreases in abundances were measured for several species. *Lepidochitona* spp. declined at two sites (Sea Lion Rookery and Cuyler Harbor) and *N. emarginata* abundances were lower at one site (Fossil Reef) in 2007 than all sampling seasons before. *Nuttallina* spp. and all species of large-sized (>15 mm) limpet counts decreased markedly at Fossil Reef and Cuyler Harbor, respectively.

Size distribution data collected for motile invertebrates in 2007 appear to be similar to measurements recorded in previous years. However, further analysis is needed to draw any inferences among sites.

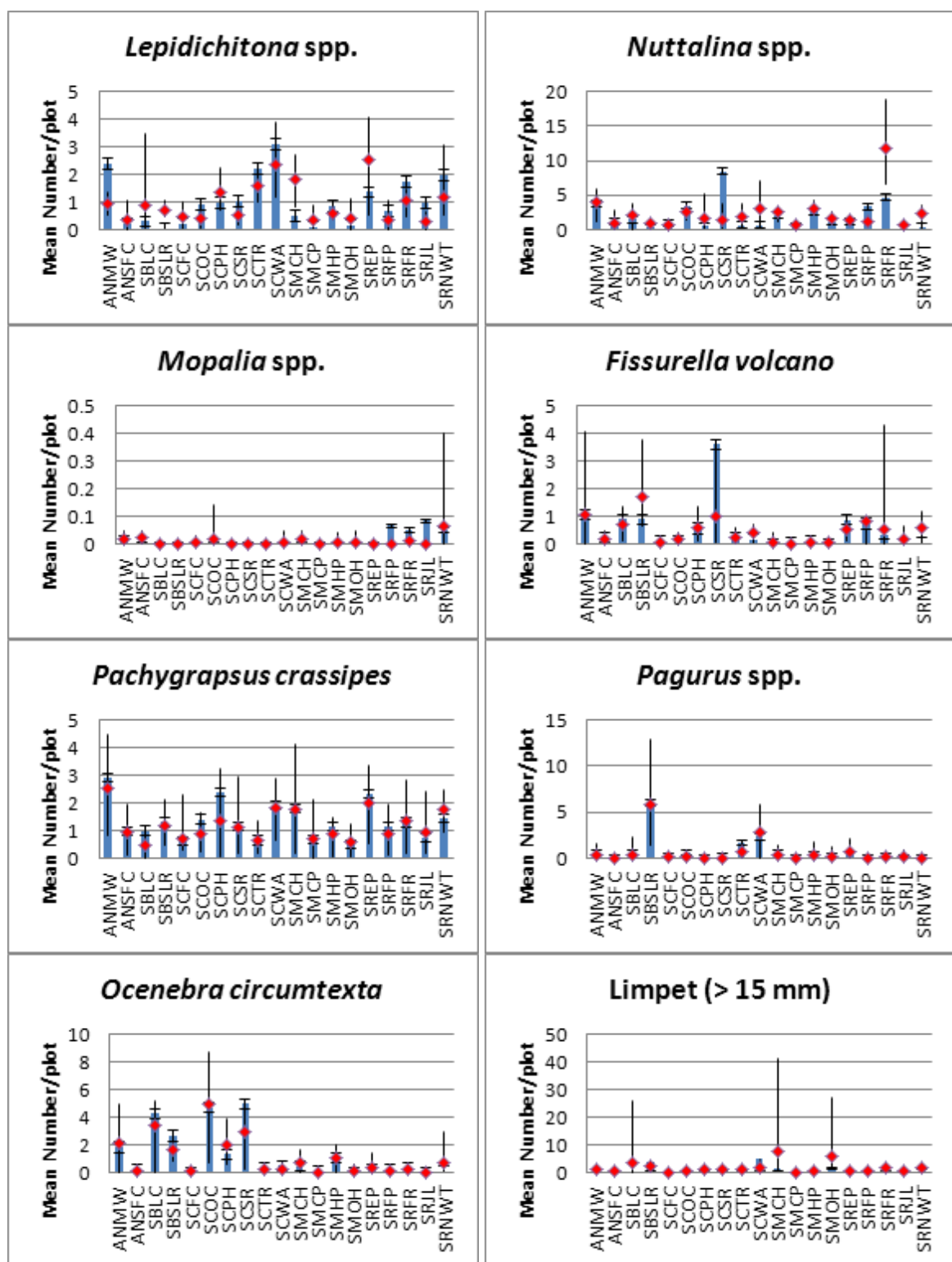


Figure 8. Motile invertebrate species mean abundances for 2007 at each site. Bars represent the mean abundance for 2007. Lines indicate the maximum and minimum distribution of mean abundances from combined previous years. Diamonds display overall mean for combined years. Note that y-axes vary by graph. See Table 10 for site codes.

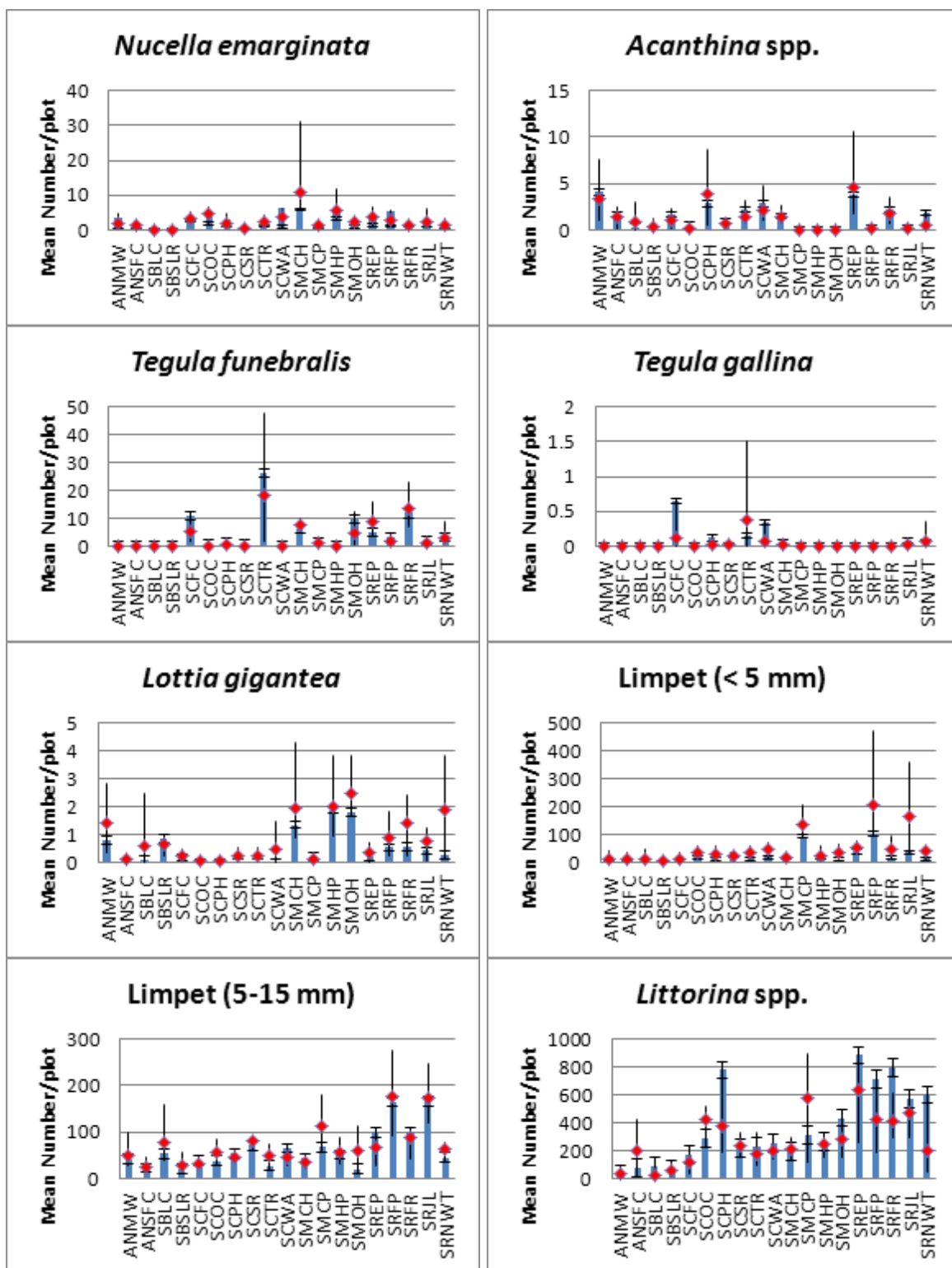


Figure 8 (continued). Motile Invertebrate species mean abundances at each site. Bars represent the mean abundance for 2007. Lines indicate the maximum and minimum distribution of mean abundances from combined previous years. Diamonds display overall mean for combined years. Note that y-axes vary by graph. See Table 10 for site codes.

Haliotis cracherodii

In 2007, we found at least 437 *Haliotis cracherodii* at the 21 monitoring sites (using maximum counts from either spring or fall for each site). Timed searches were used at all sites as the density in plots was too low to provide adequate samples. Only three abalone were found in fixed plots from all the sites (Table 4). One abalone was found in a fixed monitoring plot at Harris Point in both spring and fall. one abalone was found in fixed plots at Crook Point and Otter Harbor during the fall sample (Table 2). Abalone were not found inside any other fixed plots during 2007. Only three sites (Crook Point, Otter Harbor, Willows Anchorage) had more than 10 *H. cracherodii* located during timed or site-wide searches in spring (Table 3). During similar searches in fall, six sites (Crook Point, Harris Point, Anacapa Middle West, Orizaba Cove, Otter Harbor, Willows Anchorage) had more than 10 black abalone (Table 4). No abalone were found at Cuyler Harbor, Ford Point, Fraser Cove, Northwest-Talcott, Scorpion Rock, and South Frenchy's Cove during one, or in some cases, both monitoring seasons. One black abalone was observed at both Landing Cove and Sea Lion Rookery, and three individuals were seen found at Cat Rock.

Size distribution data from all sites combined by island are presented in Figures 9-10. Small *H. cracherodii* (< 50 mm) were uncommon at most sites and mean sizes were greater than 80 mm at all islands except Anacapa and Santa Cruz indicating low recruitment overall (Table 2). Sample sizes at most sites were too small to form meaningful conclusions about the populations based on size distribution data alone. Otter Harbor and Willows Anchorage were the only two sites that had more than 30 *H. cracherodii* present. The Willows Anchorage population had a mode at 60 mm and individuals ranged 40-110 mm. The mode of black abalone measured at Otter harbor was 80 mm in spring and 100 mm in fall. The categorical range of sizes at the same site varied from 50-190 mm in spring to 40-170 mm in fall. The largest individual (188 mm) was measured at Otter Harbor in spring.

The greatest number of *H. cracherodii* was found at Willows Anchorage. One-hundred sixty-eight individuals were counted during two consecutive days of extended searches throughout the site (Table 4). This was a substantial gain over 2006 and even over the spring survey of only 48 (Table 3). Otter Harbor had the second greatest number of abalone with 153 counted in fall and 113 in spring during extended (3 hr.) searches (Table 4).

No abalone were found exhibiting symptoms of Withering Syndrome symptoms in 2007.

Table 2. *Haliotis cracherodii*, black abalone, counts from 2007 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). AN=Anacapa, SB=Santa Barbara, SC=Santa Cruz, SM=San Miguel, SR=Santa Rosa.

Island	Year	Season	Count	Count	Area	Density	Count	Mean	StDev	Min	Max
Code			Random	InPlots	(m ²)	(m ⁻²)	Sized	Size		Size	Size
AN	2007	1	6	0	7.500	.000	6	76.50	28.20	52	116
AN	2007	3	32	0	18.500	.000	32	70.41	21.82	42	127
SB	2007	3	2	0	31.300	.000	2	83.00	1.41	82	84
SC	2007	1	59	0		.000	59	67.95	25.48	32	150
SC	2007	3	16	0		.000	16	61.69	20.95	26	115
SM	2007	1	153	1	13.600	.074	154	100.51	28.39	48	188
SM	2007	3	146	3	58.200	.052	149	102.15	24.22	40	162
SR	2007	1	10	0	80.200	.000	10	127.80	21.03	80	145
SR	2007	3	19	0	8.800	.000	19	121.21	32.26	71	182

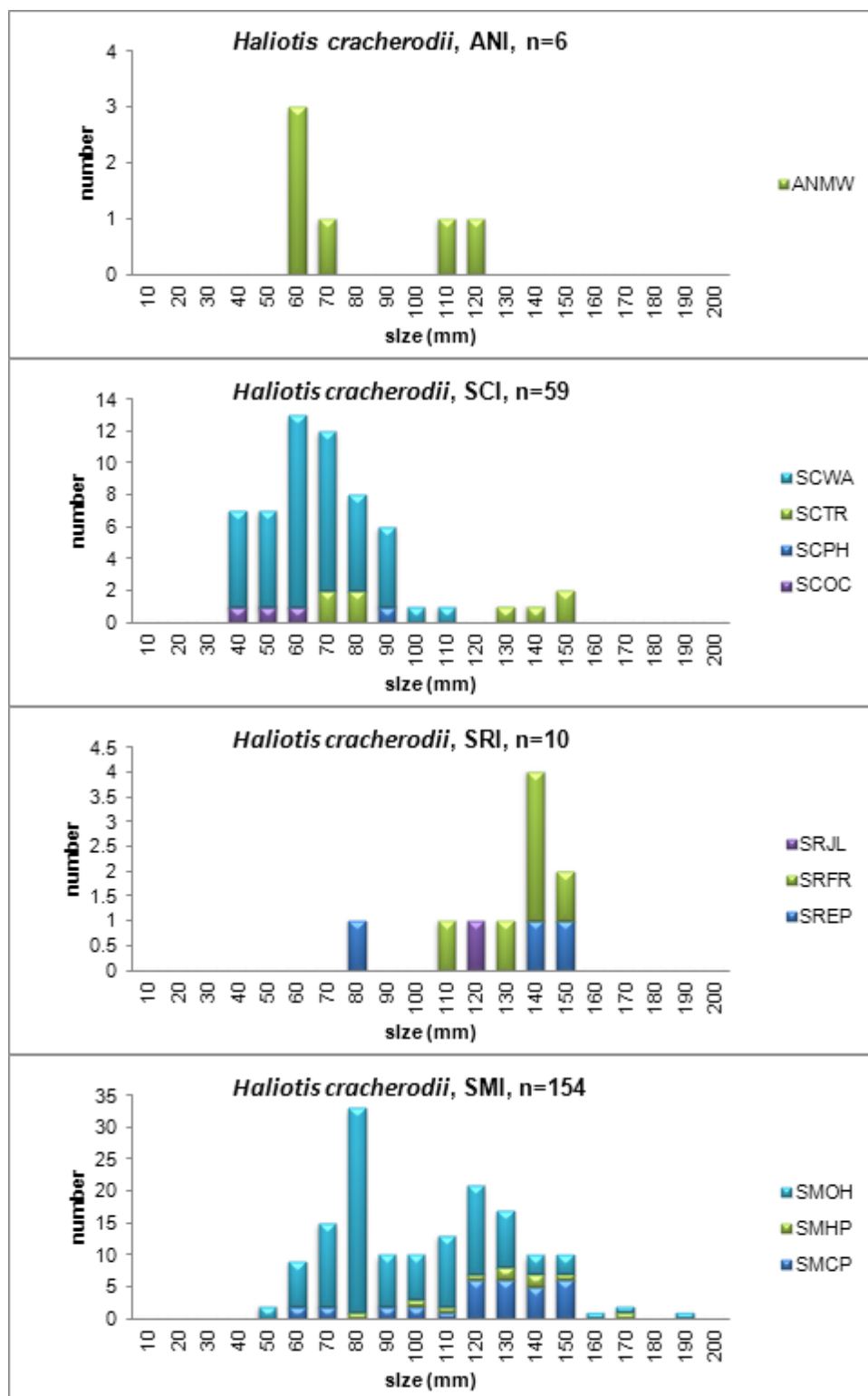


Figure 9. *Haliotis cracherodii* size distributions in spring 2007. All sampled sites were combined by island in each histogram. Note differences in scale of y-axes. See Table 10 for site codes.

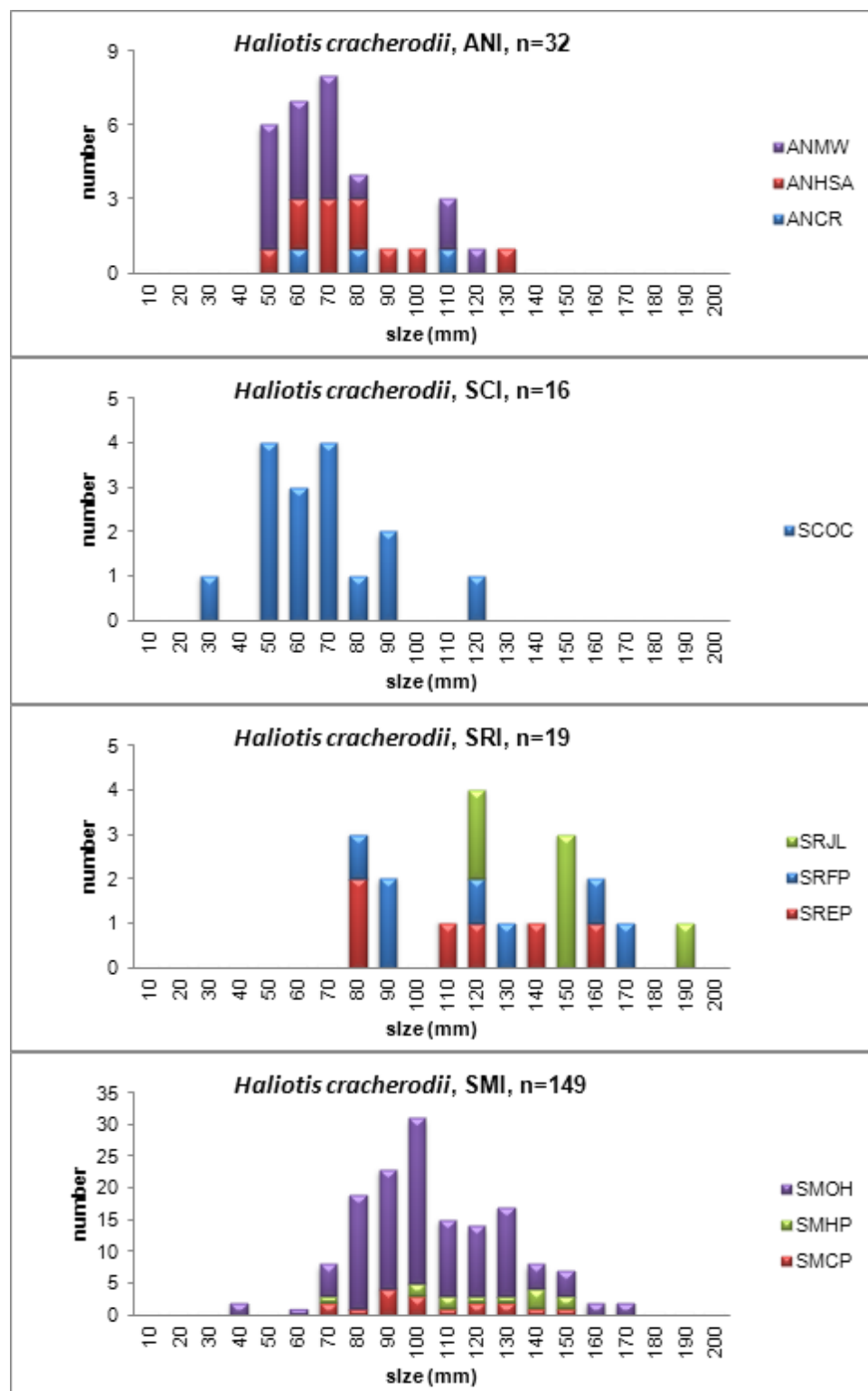


Figure 10. *Haliotis cracherodii* size distributions in fall 2007. All sampled sites were combined by island in each histogram. Note differences in scale of y-axes. See Table 10 for site codes.

Table 3. Sea star and black abalone searches in spring 2007 (x indicates no plot or transect, nc indicates no count performed, P.o.= *Pisaster ochraceus*, P.g.=*P. giganteus*, P.b.= *P. brevispinous*, P.m.= *Patiria miniata*). * = Middle Anacapa-West combined with Harbor Seal Arch.

Site	Sampling Date	Seastars in 30 min	Seastars in transects	Abalone in plots	Abalone search
Cuyler Harbor, SMI	5/21/07	88 P.o.	x	x	0
Crook Point, SMI	5/19/07	120 P.o., 1 P.g. 1 P.m.	x	0	32
Otter Harbor, SMI	5/20/07	nc	x	0	113
Harris Point, SMI	5/18/07	7 P.o., 2 P.g. 8 P.m., 1 P.h.	2	1	9 (+plot)
Fossil Reef, SRI	4/13/07	120 P.o.	35 (30x6)	0	7
Johnson's Lee, SRI	4/12/07	nc	nc	nc	1
Ford Point, SRI	4/15/07	183 P.o., 1 P.g.	x	0	0
Northwest-Talcott, SRI	4/14/07	2 P.m., 1 P.h.	x	0	0
East Point, SRI	4/16/07	71 P.o.	x	0	3
Fraser Cove, SCI	3/26/07	80 P.o.	x	x	0
Trailer, SCI	3/26/07	192 P.o.	x	x	7
Willows Anchorage, SCI	3/28/07	117 P.o.	x	x	48
Scorpion Rock, SCI	3/14/07	108 P.o.	x	x	0
Prisoner's Harbor, SCI	3/25/07	50 P.o., 1 P.g.	x	x	1
Orizaba Cove, SCI	3/15/07	503 P.o., 2 P.g.	x	x	3
Cat Rock, ANI	ns				
South Frenchy's Cove, ANI	3/17/07	14 P.o.	x	x	0
Middle Anacapa-West	3/16/07	450 P.o.	x	0	6

Table 4. Sea star and black abalone searches in fall 2007. (x indicates no plot or transect, nc indicates no count performed, P.o.= *Pisaster ochraceus*, P.g.=*P. giganteus*, P.m.= *Patiria miniata*).

Site	Sampling Date	Seastars in 30 min	Seastars in transects	Abalone in plots	Abalone search
Cuyler Harbor, SMI	1/18/08	58 (+97)	x	x	0
Crook Point, SMI	1/20/07	90		1	17
Otter Harbor, SMI	1/19/08	54 P.o., 2 P.g.	x	1	153 (3 hr.)
Harris Point, SMI	1/21/08	7 P.o., 3 P.g., 5 P.m., 1 P.h.		1	12
Fossil Reef, SRI	ns				
Johnson's Lee, SRI	1/3/08	291 P.o.	23 (10x2)	0	6
Ford Point, SRI	1/3/08	614 P.o.	x	0	7
Northwest-Talcott, SRI	ns				
East Point, SRI	1/5/08	374 P.o.	0	nc	6
Fraser Cove, SCI	ns				
Trailer, SCI	ns				
Willows Anchorage, SCI	9/27/07	123 P.o., 1 P.g.	x	x	168
Scorpion Rock, SCI	ns				
Prisoner's Harbor, SCI	ns				
Orizaba Cove, SCI	12/22/07	537 P.o.	x	x	16
Cat Rock, ANI	12/21/07	7 P.o., 2 P.g.	x	0	3
South Frenchy's Cove, ANI	12/21/07	16 P.o.	x	x	0
Middle Anacapa-West	12/20/07	521 P.o., 1 P.g.	x	0	17
Landing Cove, SBI	10/25/07	379 P.o.	44 (18x2)	x	1
Sea Lion Rookery, SBI	10/26/07	716 P.o.	x	0	1

Lottia gigantea

Lottia gigantea are usually sampled in fall, alternating with motile invertebrate counts in spring. However, two sites (Trailer and Johnson's Lee) were sampled in spring and several sites (Ford Point, Fossil Reef, Northwest-Talcott, Fraser Cove and Willows Anchorage) were not sampled in 2007 due to logistical difficulties and/or hazardous conditions. For those sites not sampled in 2007, the most recent data (fall, 2006) are referenced for interpretive purposes. Data for individual sites can be found in the field logs in Appendix C of this report and the 2006 annual report.

With the exceptions of Fraser Cove, Ford Point, Trailer, and Johnson's Lee, *Lottia gigantea* densities in 2006-2007 were comparable to initial densities (Figures 11-14). In the case of the four aforementioned sites, particularly Johnson's Lee, abundances have decreased slowly but markedly over time. At Willows Anchorage and Otter Harbor, densities have fluctuated throughout the course of the monitoring program. In 2007, owl limpet densities averaged across all plots were highest at Harris Point (12.9 m^{-2}) compared with other sites and lowest at South Frenchy's Cove (2.0 m^{-2}).

Mean shell lengths of *L. gigantea* in 2007 varied greatly among islands, sites, and plots (Tables 5 and 6, Appendix C- trip reports). The largest owl limpets were observed at Trailer (mean = 73.3 mm) and the smallest were measured at Cat Rock (mean = 35.8 mm).

At San Miguel, the mean sizes of owl limpets at both monitoring sites remained relatively stable over time (Figure 14). In 2007, the Harris Point population was slightly skewed towards larger individuals with the mode (29%) occurring at 30-39 mm (fall trip report – Appendix C). *L. gigantea* at Otter Harbor had a normal distribution and mode (29%) at 40-49 mm.

Johnson's Lee was the only site at Santa Rosa sampled in 2007 (mean shell length = 47.8 mm, mode = 50-59 mm). In 2006, the population at Johnson's Lee was skewed towards smaller individuals with most (23%) measuring less than 20 mm indicating strong recruitment. Mean lengths for *L. gigantea* sampled at other sites in fall 2006 ranged 42 mm (Ford Point) to 67 mm (Northwest-Talcott) (see 2006 annual report, Richards and Tharratt *in prep*). Owl limpets at Fossil Reef were normally-distributed with most (27%) 50-59 mm. Ford Point plots were comprised predominantly of smaller *L. gigantea* with 39 percent 20-39 mm. Comparatively, Northwest-Talcott had larger limpets (mode = 70-79 mm).

Trailer was the only Santa Cruz Island site sampled in 2007. Mean size of owl limpets at Trailer was 73.3 mm and most (32%) were 70-79 mm. In fall, 2006, the mean sizes of *L. gigantea* at Fraser Cove and Willows Anchorage were 48.8 mm and 36.0 mm, respectively. The population sampled at Fraser had a bimodal distribution (modes = 30-39 mm and 50-59 mm). Willows Anchorage owl limpets were more normally-distributed (mode = 30-39 mm).

At Anacapa, both sites with *L. gigantea* plots were sampled in 2007. Mean sizes at Cat Rock and South Frenchy's Cove were 35.8 mm and 43 mm, respectively. The mode (43%) at Cat Rock was 30-39 mm. Owl limpets at South Frenchy's Cove were primarily (37%) 30-39 mm.

We do not have fixed plots for sampling owl limpets at Santa Barbara Island; however, we randomly collected size frequency measurements at Sea Lion Rookery (Tables 5 and 6). Mean shell lengths were intermediate in size compared with other islands, and size classes were normally distributed with most (41%) measuring 40-49 mm.

Table 5. *Lottia gigantea* plot count and size information. All sites pooled by island (Santa Rosa spring sample was only two sites). AN=Anacapa, SB= Santa Barbara, SC=Santa Cruz, SM= San Miguel, SR=Santa Rosa.

Island Code	Season	Count Sized	Area	Density	Mean Size	StDev	MinSize	MaxSize
SC	Spring	31	12.56	2.467	73.26	14.60	41	94
SR	Spring	48	9.42	5.094	47.83	22.07	13	90
AN	fall	84	18.85	4.457	37.42	10.20	18	58
SB	fall	156		.000	41.71	9.57	15	66
SM	fall	348	47.41	7.340	36.79	15.10	12	77

Table 6. Size distribution of *Lottia gigantea*. All sites pooled by island. See Table 6 heading for island code descriptions.

Island Code	Season	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm	%80-89mm	%90-99mm	%>=100mm
SC	spring	0.00%	0.00%	0.00%	6.45%	9.68%	19.35%	32.26%	22.58%	9.68%	0.00%
SR	spring	10.42%	16.67%	12.50%	12.50%	18.75%	12.50%	4.17%	10.42%	2.08%	0.00%
AN	fall	2.38%	22.62%	41.67%	14.29%	19.05%	0.00%	0.00%	0.00%	0.00%	0.00%
SB	fall	0.64%	10.90%	27.56%	41.03%	16.67%	3.21%	0.00%	0.00%	0.00%	0.00%
SM	fall	12.93%	23.85%	22.13%	19.83%	12.36%	5.46%	3.45%	0.00%	0.00%	0.00%

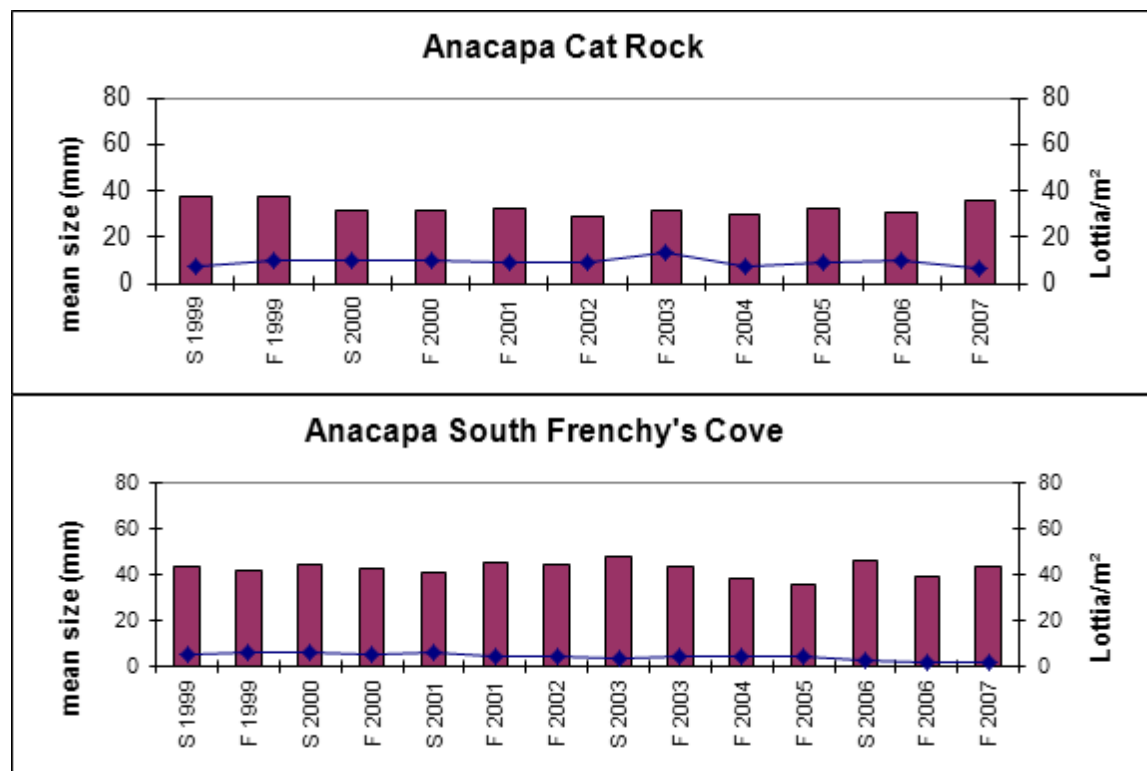


Figure 11. *Lottia gigantea* at Anacapa Island 1999-2007. Bars represent mean size (mm) and lines represent mean density from three fixed plots. S=spring samples, F=fall samples.

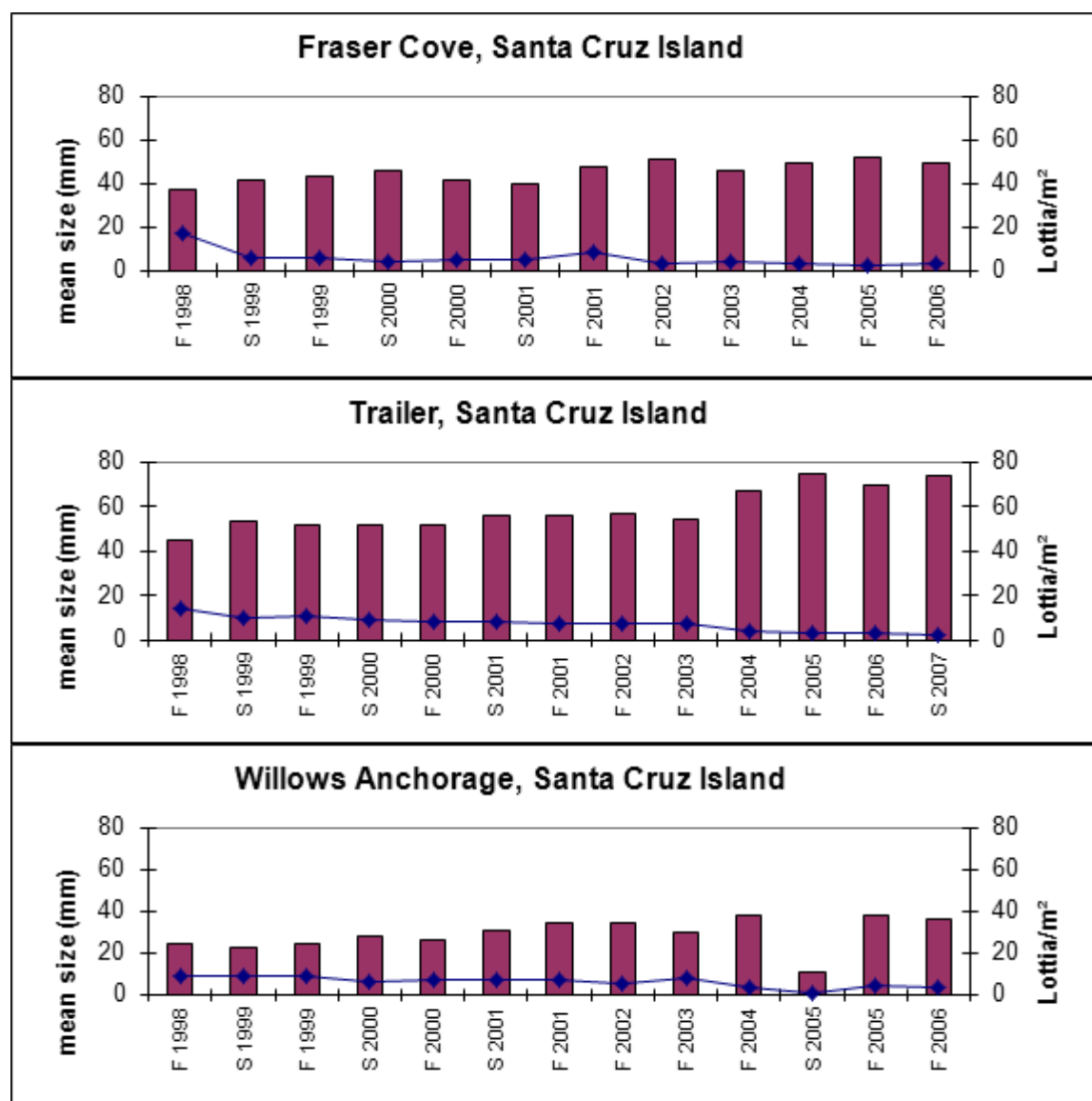


Figure 12. *Lottia gigantea* at Santa Cruz Island 1998-2007. Bars represent mean size (mm) and lines represent mean density from five fixed plots. S=spring samples, F=fall samples.

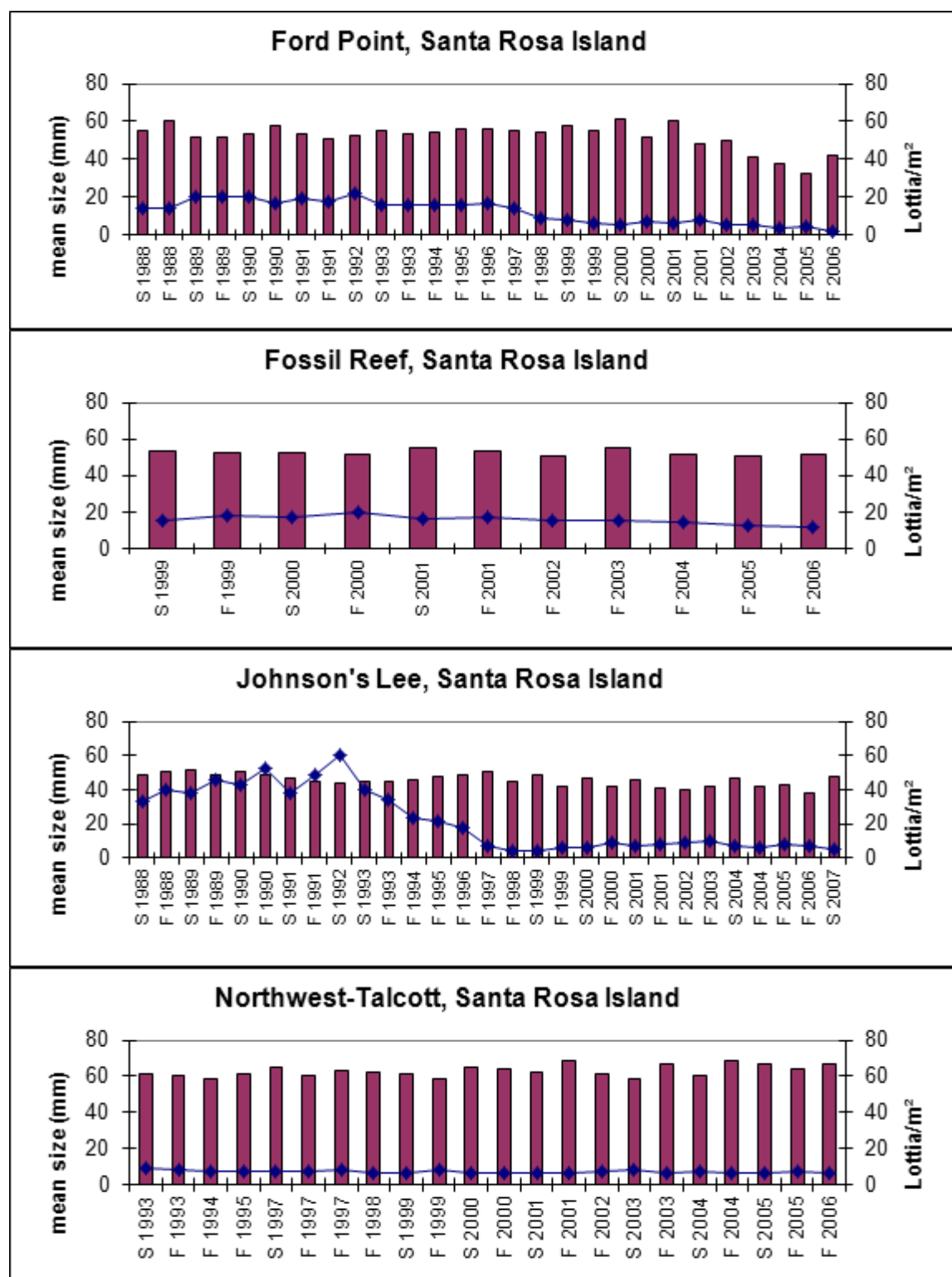


Figure 13. *Lottia gigantea* at Santa Rosa Island 1988-2007. Bars represent mean size (mm) and lines represent mean density from five fixed plots. S=spring samples, F=fall samples.

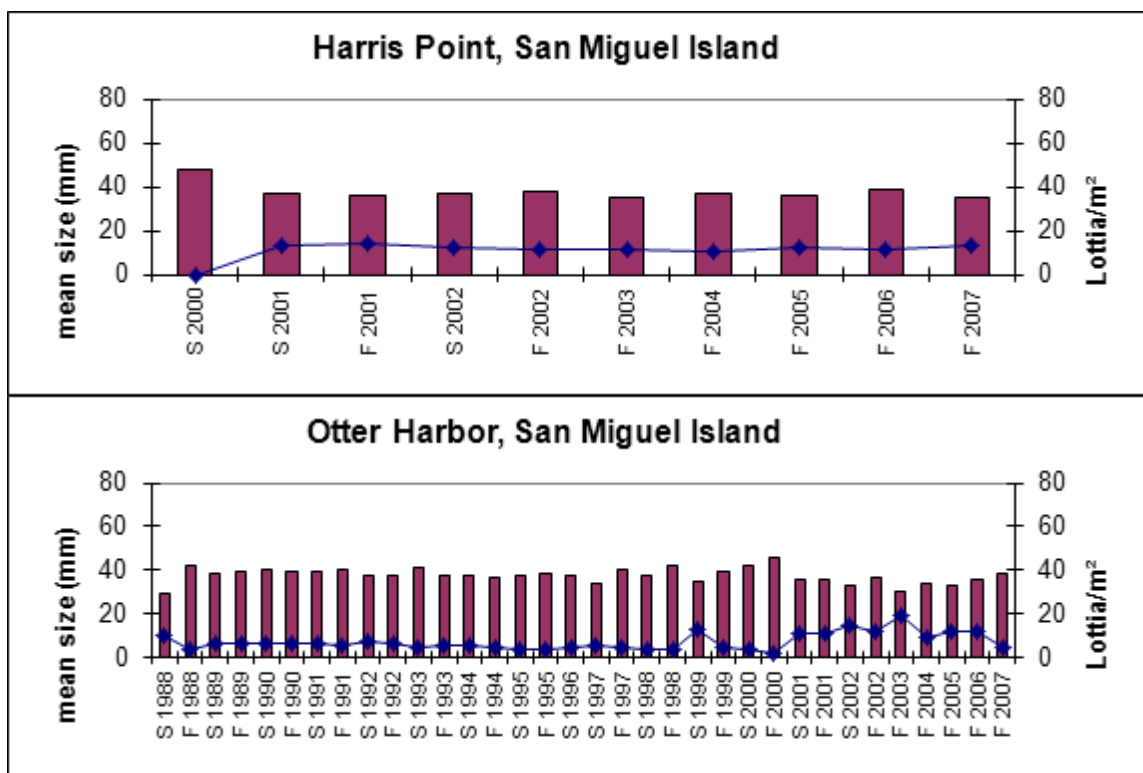


Figure 14. *Lottia gigantea* at San Miguel Island 1988-2007. Bars represent mean size (mm) and lines represent mean density from five fixed plots. S=spring samples, F=fall samples.

Pisaster ochraceus

Timed searches for sea stars were done at all sites at least once in 2007 (Tables 3 and 4). *Pisaster ochraceus* was the most abundant species, but *P. giganteus*, *Patiria miniata* and *Pycnopodia helianthoides* were occasionally found. These timed searches were conducted over the majority of the monitoring reef to allow for the transitory nature of the sea stars. Fixed transects were counted at three sites that have consistently had high numbers of sea stars. The densest transect count was at Landing Cove with over one per square meter. Over time, the abundances of *P. ochraceus* have fluctuated markedly at most sites, with the exceptions of Cat Rock, Harris Point, Northwest-Talcott, and South Frenchy's Cove; all sites which have never had many sea stars (Figure 15). Compared with previous years, sea stars were moderately abundant at most sites in 2007 (Figure 15, Tables 3 and 4). More than 500 *P. ochraceus* were observed in 30 minute timed-counts at Anacapa Middle-West, Ford Point, Orizaba Cove, and Sea Lion Rookery. In fact, all the aforementioned sites including East Point supported record high numbers of sea stars in 2007 compared with earlier surveys. Sea Lion Rookery had nearly eight times as many *P. ochraceus* as any previous sample. At most other sites, 100-400 stars were located during timed counts. Less than 25 *P. ochraceus* were observed at Cat Rock, Harris Point, Northwest-Talcott and South Frenchy's Cove; all these sites typically support low abundances of *P. ochraceus*.

Size-frequency measurements were collected at most sites in 2007 (Figures 16-17 and Appendix C). The mean size-distribution of *P. ochraceus* populations ranged 58-122 mm across sites. The smallest and largest ochre stars were observed at Willows Anchorage and Otter Harbor, respectively. Most sites followed a normally-distributed size-frequency; though *P. ochraceus* at Willows Anchorage had two nearly equivalent modes occurring at 40 mm and 120 mm in fall, the Fraser Cove population had three modes (60 mm, 130 mm, 180 mm) and the majority of East Point and Orizaba Cove sea stars were skewed toward larger individuals. The modes of sea star populations at most other sites were typically between 70 mm and 120 mm.

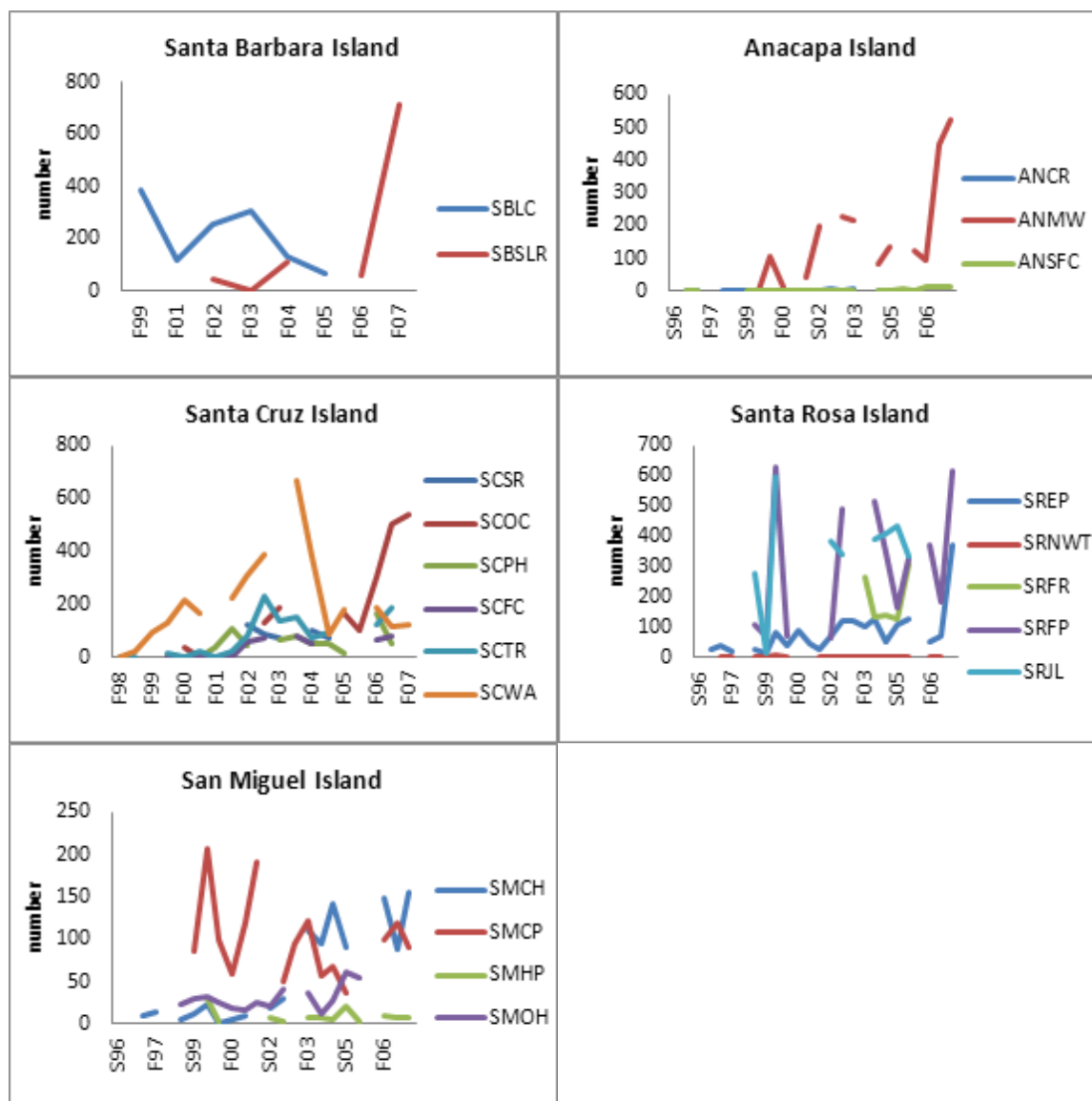


Figure 15. Number of *Pisaster ochraceus* sampled during timed counts (typically 30-minute durations) each season at every site. Note differences in scales of y-axes. See table 2 for site codes. S=spring, F=fall.

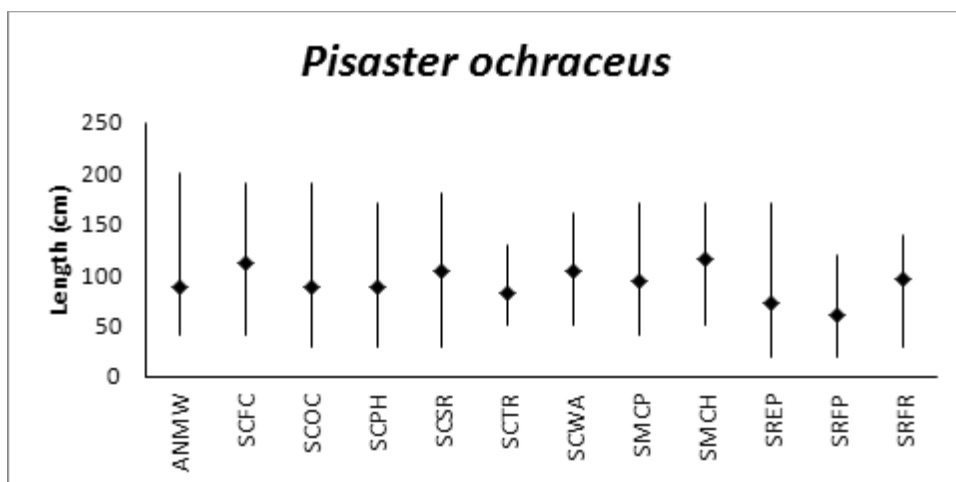


Figure 16. *Pisaster ochraceus* sampled in spring 2007. Diamonds represent the mean length (measured as longest ray), and vertical lines represent the range of lengths. N>30 *P. ochraceus* were measured at each site. See table 2 for site codes.

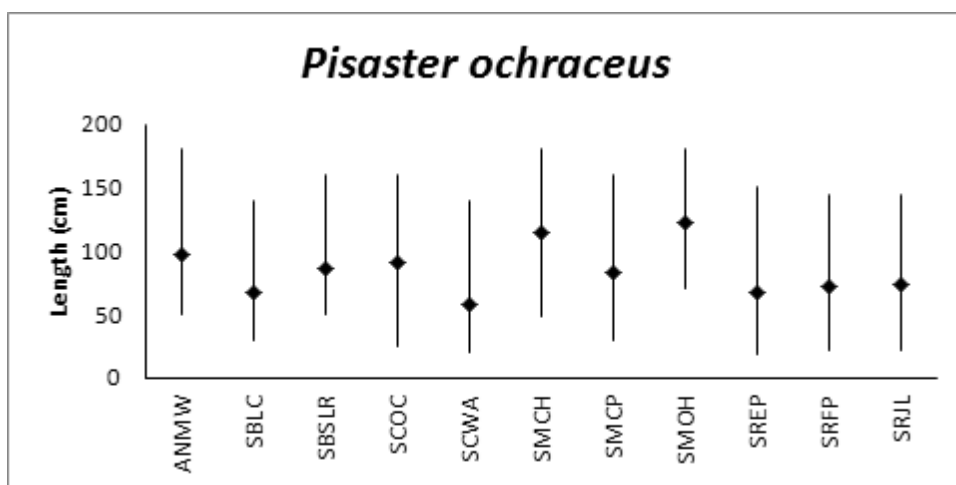


Figure 17. *Pisaster ochraceus* sampled in fall 2007. Diamonds represent the mean length (measured as longest ray), and vertical lines represent the range of lengths. N>30 *P. ochraceus* were measured at each site. See table 2 for site codes.

Phyllospadix spp.

Phyllospadix spp., surfgrass cover has been monitored at two sites on Santa Cruz Island since fall 1998, and at two sites on Santa Rosa Island since spring 2002 (Figures 18-19 and Appendix C). The four sites were chosen for study based on the relatively high density of surfgrass habitat present. *Phyllospadix torreyi* has been the dominant species in most transects but some *P. scouleri* has also been present.

Strong seasonal patterns have been observed over the years at Fraser Cove and Trailer whereby surfgrass overstory cover has routinely declined in spring and increased in fall. The same trends could not be detected in 2007 since surveys were not completed in fall. All three transects at both Santa Cruz sites experienced declines, some marked. Surfgrass cover decreased approximately 15-50 % on transects located at Fraser Cove and 5-20 % at Trailer.

Santa Rosa sites, East Point and Northwest-Talcott, typically have not displayed a strong seasonal pattern in *Phyllospadix* spp. abundances. Instead, surfgrass on all three transects at East Point and two at Northwest-Talcott has remained relatively stable over time. Transect-3 surfgrass at the latter site has fluctuated markedly over the monitoring period declining rapidly several times by as much as 40% followed by gradual increases in cover. In 2007, Transect-3 at Northwest-Talcott displayed a decreasing trend in surfgrass abundance throughout the year. All three transects at East Point and the two others at Northwest-Talcott displayed neutral growth trends in *Phyllospadix* spp. overstory cover compared with previous years.

Phyllospadix spp. blades were typically bleached and/or abraded along all transects, particularly those at Northwest-Talcott and East Point. However surfgrass occurring in the lowest intertidal zones appeared healthy at all four sites. Epiphytic cover (composed of *Smithora naiadum* and *Melobesia mediocris*) was high on the surfgrass at East Point.

Red algae, composed primarily of *Chondracanthus canaliculatus*, *Prionitis lanceolata*, and *Mazzaella affinis*, was common on the three transects at both Fraser Cove and Trailer in 2007. Mean abundances at the two sites ranged 12% to 47% across all transects. Articulated corallines and feather boa kelp, *Egregia menziesii*, were commonly observed in low abundances on most transects at all four sites.

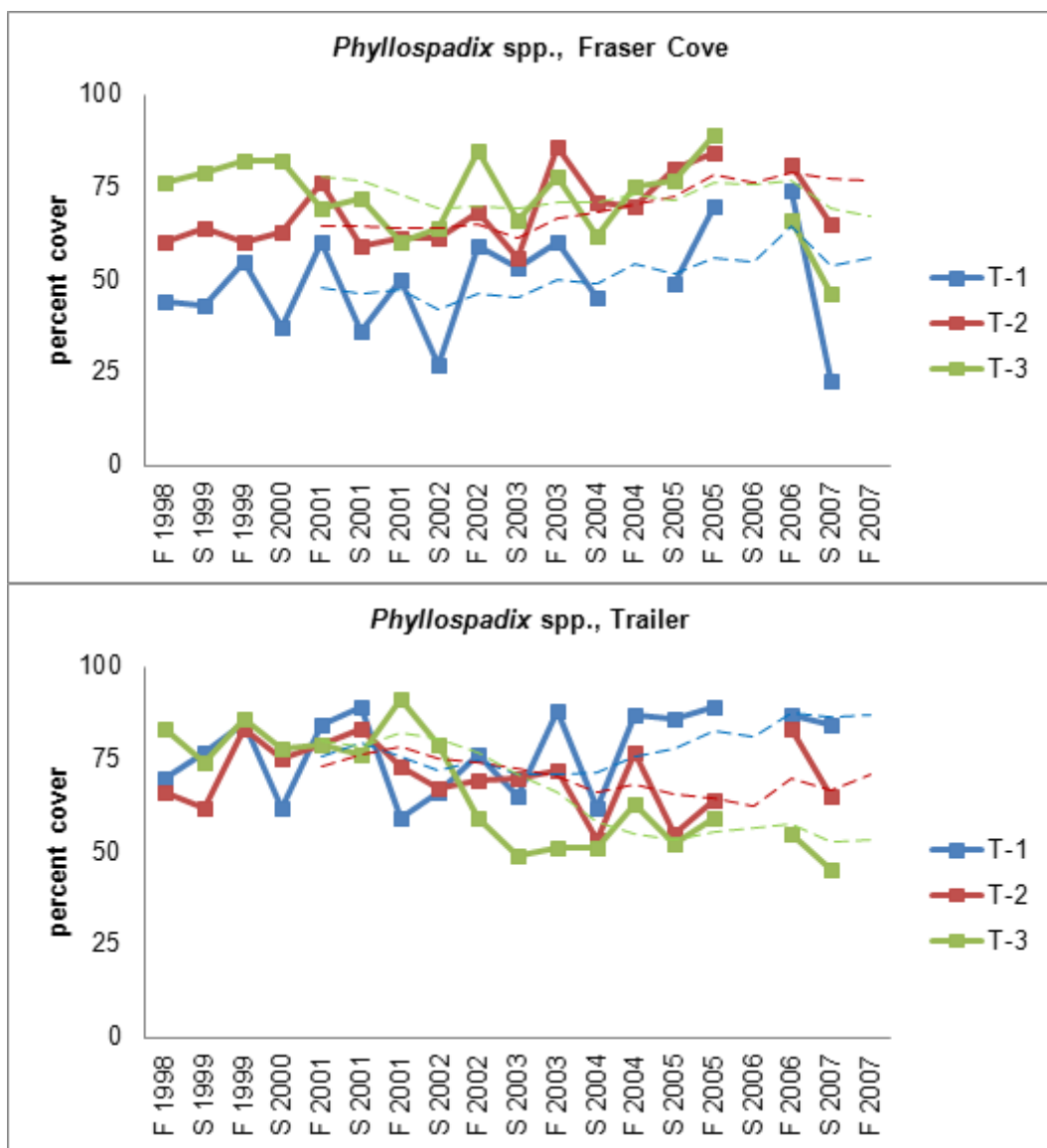


Figure 18. *Phyllospadix* spp. cover trends on 10m point-intercept transects at Fraser Cove and Trailer, Santa Cruz Island. S=spring samples, F=fall samples. Dashed lines indicate five-sample moving trends for percent cover of *Phyllospadix* spp. cover on each transect.

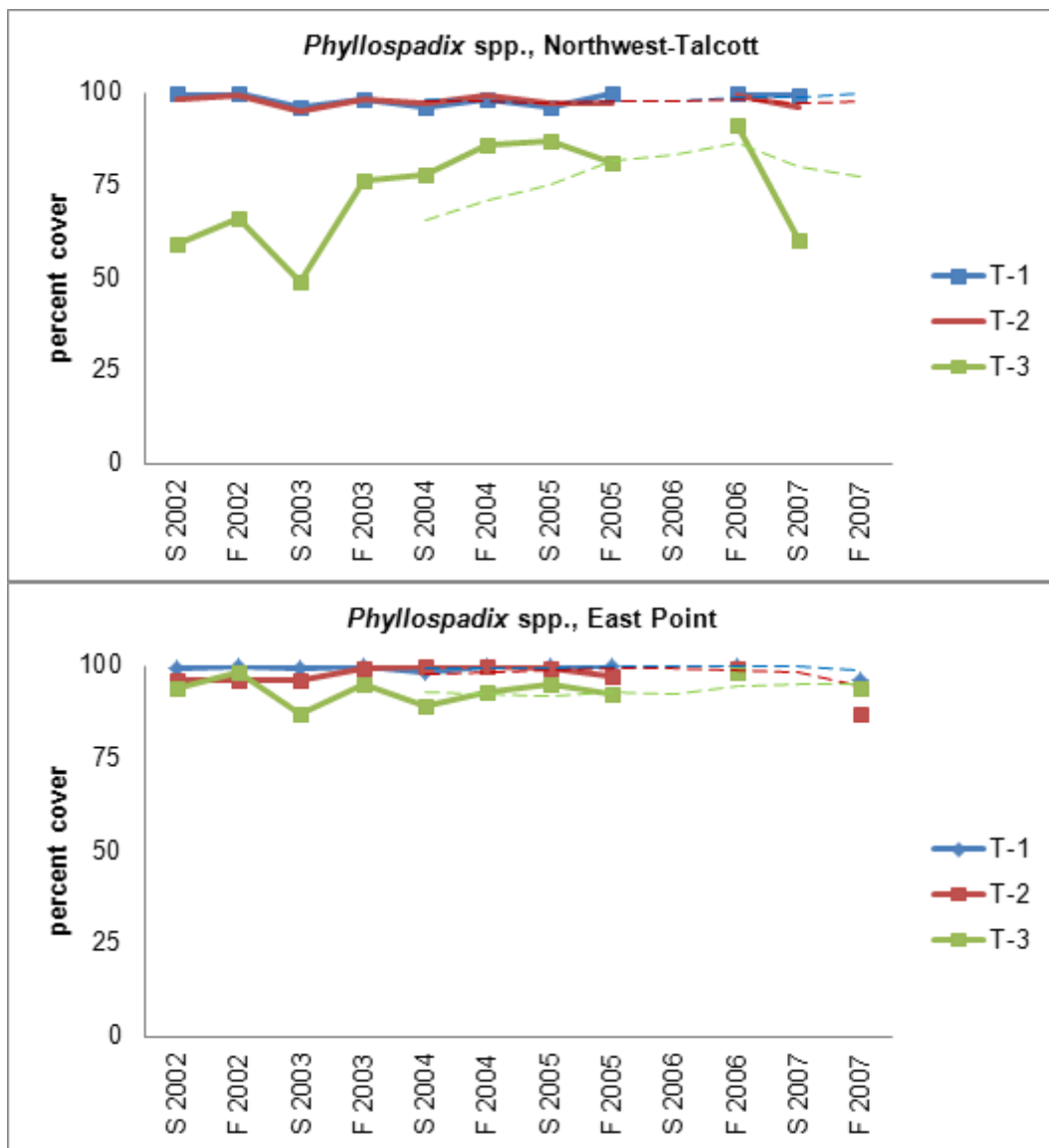


Figure 19. Surfgrass, *Phyllospadix* spp., cover trends on 10m point-intercept transects at East Point and Northwest-Talcott, Santa Rosa Island. S=spring samples, F=fall samples. Dashed lines indicate five-sample moving trends for percent cover of *Phyllospadix* spp. cover on each transect.

Shorebirds and Pinnipeds

The maximum number of shorebirds and pinnipeds observed at any one time during a visit to each site sampled in 2007 is summarized in Tables 7 and 8. Black oystercatchers were once again the most ubiquitous shorebird; at least one and as many as 10 individuals were seen at nearly all sites in spring and fall. American oystercatcher sightings have become more frequent during the past several years. In spring, one American oystercatcher was observed at both Fraser Cove and Willows Anchorage and two individuals were seen at Scorpion Rock. During the fall sampling, two American oystercatchers were seen at Cat Rock and one was seen at Otter Harbor.

Black turnstones, once abundantly present at the islands, have increasingly become less common since the 80s. Two to four individuals were observed at Fraser Cove, Ford Point and Northwest-Talcott in spring. In fall, three black turnstones were present at Landing Cove and four were seen at Sea Lion Rookery.

Seabirds such as gulls, cormorants and pelicans are typically observed at rocky points and islets. In 2007, western gulls were seen at nearly half the sites sampled in spring. Numbers of individuals ranged 2- 30 per site. Western gulls were not as common in fall whereby only a handful of birds were seen at as many sites. Cormorants were relatively common at East Point and Cuyler Harbor; flocks of 60 and 18 individuals were seen at each of the sites, respectively. In fall, 20 cormorants were present at Crook Point. Brown Pelicans were only observed at East Point (10 birds present in spring).

Other less common birds observed at various sites over the course of the year included several wandering tattlers, groups of sanderlings (15) and western meadowlarks (5) as well as a sandpiper, song sparrow and black phoebe.

Harbor seals, *Phoca vitulina*, were observed within the immediate vicinity of eight sites in spring and 5 sites in fall, 2007. Typically only 1-2 individuals were seen per site, but 10-11 individuals were seen at Northwest-Talcott and Otter Harbor in spring and 26 seals were present at the latter site in fall.

Northern elephant seal, *Mirounga angustirostris*, abundance was comparable during both monitoring seasons. Ten individuals were observed each season though presence only occurred at two sites in spring and five sites in fall. The greatest number of elephant seals seen at one time was at Otter Harbor (n=8) in spring.

California sea lions, *Zalophus californianus*, were only present at the aptly-named site, Sea Lion Rookery and Anacapa Middle-West. This year approximately 300 individuals including juveniles and adults were observed at Sea Lion Rookery. Two sea lions were seen at Anacapa Middle-West, swimming by the site but not on the rocks.

Table 7. Shorebirds and Pinnipeds at monitoring sites in spring 2007 (maximum seen at any one time).
(*= nearby but not on monitoring reef).

Site	Black Oystercatcher/ (American)	Black Turnstone	Other birds	<i>Phoca vitulina</i>	<i>Mirounga Angustirostris</i>	<i>Zalophus californianus</i>
ANCR	ns	0	0	0	0	0
ANMW	5	0	0	2	0	0
ANSFC	3	0	1 wandering tattlers, 2 western gulls	0	0	0
SCFC (Forneys)	5	0	15 sanderlings, 1 royal tern	0	0	0
SCFC (Fraser)	10(1)	2	0	0	0	0
SCTR	5	0	4 western gulls	0	0	0
SCWA	7(1)	0	0	0	0	0
SCPH	0	0	2western gulls, 1 sandpiper, 3 cormorants	0	0	0
SCSR	7 (2)	0	0	1	0	0
SCOC	4	0	1 belted kingfisher, 2 western gulls	1	0	0
SREP	2	0	10 brown pelicans, 60 cormorants,20 western gulls	0	0	0
SRFP	4	3	0	0	0	0
SRFR	3	0	1 wandering tattlers, 8 western gulls, 1 song sparrows	1	0	0
SRJL	1	0	0	1	0	0
SRNWT	2	4	15 western gulls	10	0	0
SMCH	4	0	18cormorants*	0	2	0
SMCP	5	0	1 wandering tattler, 30 western gulls	0	0	0
SMHP	8	0	7 western gulls	4	0	0
SMOH	7	0	10 western gulls, 1 cormorant	11	8	0

* ns- not sampled

Table 8. Shorebirds and Pinnipeds at monitoring sites in fall 2007 (maximum seen at any one time). (*= nearby but not on monitoring reef).

Site	Black Oystercatcher/ (American)	Black Turnstone	Other birds	<i>Phoca vitulina</i>	<i>Mirounga Angustirostris</i>	<i>Zalophus californianus</i>
SBLC	1	3	1 black phoebe, 5 western meadowlark	0	0	0
SBSLR	1	4	6 western gulls	0	0	300
ANCR	4 (2)	0	0	0	0	0
Middle –all	2	0	0	1	0	2*
ANSFC	2	0	0	0	0	0
SCFC (Forneys)	ns					
SCFC (Fraser)	ns					
SCTR	ns					
SCWA	2	0	1 cormorant	0	0	0
SCSR	ns					
SCOC	2	0	0	3	0	0
SREP	4	0	0	0	0	0
SRFP	2	0	1 western gull	0	0	0
SRFR	ns	0	0	0	0	0
SRJL	2	0	2 western gulls	1	4	0
SRNWT	ns	0	0	0	0	0
SMCH	4	0	0	0	1	0
SMCP	6	0	1 western gull, 20 cormorants	0	3	0
SMHP	6	0	0	5	1	0
SMOH	4 (1)	0	3 western gulls	26	1	0

* ns- not sampled

Visitation

In 2007, as in previous years, most visitors accessed the rocky intertidal in Channel Islands National Park at Frenchy's Cove, Anacapa Island. Island Packers Company (IPCO) and Truth Aquatics transported school groups and other visitors (1,151 passengers) to Frenchy's primarily to conduct classroom programs at the site and adjacent reefs in winter and spring months (Table 9, Figure 20). Total visitation in 2007 was 13% lower than in 2006 and 23% less than the number of passengers in 2005 (Figure 21). March was once again the top month for visitation with 668 passengers on 7 trips. Seventy-six percent of the visitation occurred during March and April. There was no visitation during February, May, June, and August through November.

Some visitors also explored East Point and Prisoner's Harbor tidepools on Santa Rosa and Santa Cruz Islands, respectively. However, no records are available for the number of private boaters going ashore or island visitors utilizing these sites.

Table 9. Visitors to South Frenchy's Cove, Anacapa Island via Island Packers in 2007.

MONTH	#Passengers	#TRIPS	Pass/trip
January	171	2	86
February	0	0	0
March	668	7	95
April	211	2	106
May	0	0	0
June	0	0	0
July	35	1	35
August	0	0	0
September	0	0	0
October	0	0	0
November	0	0	0
December	66	1	66
Total	1151	13	Avg.=89

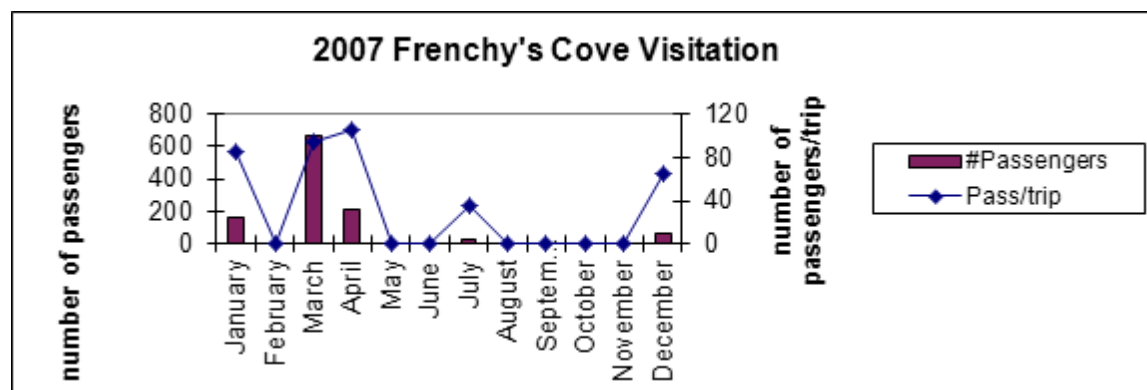


Figure 20. Visitation at Frenchy's Cove, Anacapa (Island Packers visitors).

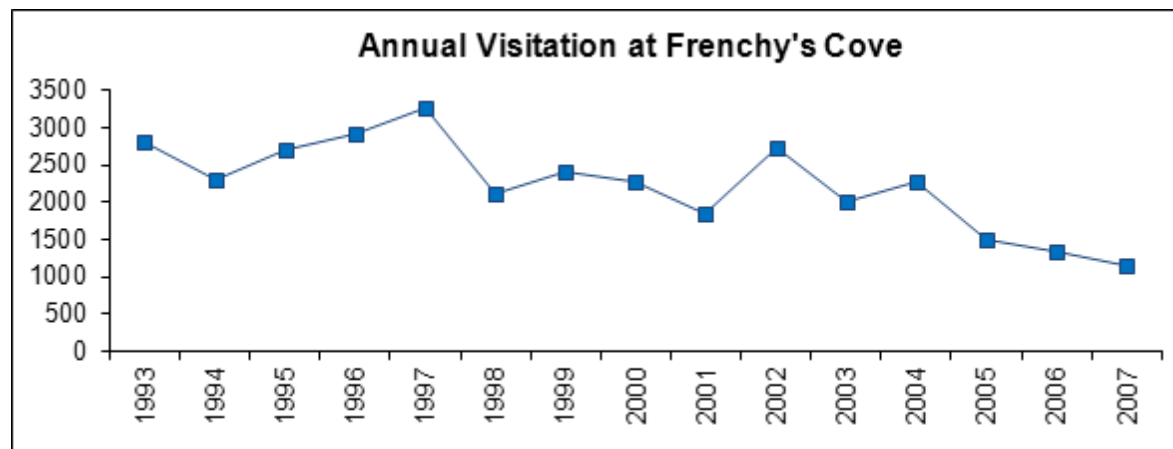


Figure 21. Annual Commercial Visitation at Frenchy's Cove, Anacapa (Island Packers visitors) 1993-2007.

Trip Reports

Trip reports were written by Dan Richards. 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 included in the trip reports. Summary tables and figures in the trip reports present additional information on species monitored. For simplicity, non-core species are reported in photo-plot data tables as miscellaneous algae, miscellaneous animals, or other. More detailed results of sea star, surfgrass, and motile invertebrate sampling are presented in the daily trip reports.

Trip reports contain information on beach surveys or other work done at the islands. Beach-walk surveys were conducted on the same trips as the rocky intertidal monitoring at San Miguel and Santa Rosa Islands in spring and fall. The purpose of those surveys was primarily to collect information on live and dead seabirds and marine mammals. Beach-walk data will be reported separately.

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Appendix A: Program Notes

2007 Sampling Events

Most sites were sampled in spring and fall (Table 10). The two sites at Santa Barbara Island were not sampled in spring because of difficulties with access due to nesting California brown pelicans. Cat Rock was not sampled in spring and several sites (Fossil Reef, Fraser Cove, Northwest-Talcott, Prisoners Harbor, Scorpion Rock and Trailer) were not sampled in fall due to logistical complications. Santa Cruz Island sites were skipped either because Dan was participating in assessments of the COSCO BUSAN oil spill in San Francisco Bay or large swell caused cancellation of boat transportation. Santa Rosa sites were not sampled due to road closures caused by heavy rains, preventing access to the west end of the island.

Additional visits to Santa Cruz and San Miguel Islands were made to conduct black abalone surveys. *H. cracherodii* were PIT tagged at Willows Anchorage in December, 2006, and recapture attempts occurred January 30th through February 2nd, June 18th and September 26th through 28th. At Otter Harbor, black abalone tagging was executed during a three-day tour in February (14-16 February).

High incidence of Domoic Acid poisoning of dolphins, sea lions and pelicans was reported during April and May. Some evidence of poisoning was observed during beach walks at Santa Rosa Island during the same time period.

Three deceased blue whales were seen in the channel during September. Skull fractures on two of the whales were consistent with injuries caused by collisions with maritime vessels.

Table 10. 2007 Sampling dates for Rocky Intertidal Monitoring sites.

Site	Site Codes	Spring	Fall
Cuyler Harbor, SMI	SMCH	21 May 07	18 Jan 08
Crook Point, SMI	SMCP	19 May 07	20 Jan 08
Otter Harbor, SMI	SMOH	20 May 07	19 Jan 08
Harris Point, SMI	SMHP	18 May 07	21 Jan 08
Fossil Reef, SRI	SRFR	13 Apr 07	*
Johnson's Lee, SRI	SRJL	12 Apr 07	3 Jan 08
Ford Point, SRI	SRFP	15 Apr 07	3 Jan 08
Northwest-Talcott, SRI	SRNWT	14 Apr 07	*
East Point, SRI	SREP	11,16 Apr 07	5 Jan 08
Fraser Cove, SCI	SCFC	26 Mar 07	*
Trailer, SCI	SCTR	26,27 Mar 07	*
Willows Anchorage, SCI	SCWA	28, 29 Mar 07	27 Sept 07
Scorpion Rock, SCI	SCSR	14 Mar 07	*
Prisoner's Harbor, SCI	SCPH	25, 30 Mar 07	*
Orizaba Cove, SCI	SCOC	15 Mar 07	22 Dec 07
Cat Rock, ANI	ANCR	*	21 Dec 07
South Frenchy's Cove, ANI	ANSFC	17 Mar 07	21 Dec 07
Middle Anacapa-West	ANMW	16 Mar 07	20 Dec 07
Middle Anacapa-East	ANME	16 Mar 07	20 Dec 07
Landing Cove, SBI	SBLC	--	24,25,27 Oct 07
Sea Lion Rookery, SBI	SBSLR	--	26 Oct 07

--no spring sample because of nesting pelicans

* no sampling due to logistical problems

Appendix B. Photoquadrat Data Tables

Percent cover of selected taxa in fixed 50 x 75 cm photoquadrats are based on 100 points per plot. Target taxa are presented in the tables for each site and each sampling season (spring and fall). Acorn barnacle taxa include *Balanus glandula* and *Chthamalus fissus/dalli*. *Pollicipes polymerus* is listed as leaf barnacle. Turf-weed taxa are only used at Landing Cove Santa Barbara Island and include *Chondracanthus (Gigartina) canaliculatus*, *Gelidium* sp. and *Pterocliadiella capillacea*. The mussel taxa are *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 them to the database; however, because most are rare and to facilitate comparisons with past data, most species are lumped 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.

Percent Cover of Index Species
Middle-East, Anacapa Island - spring 2007 (3/16/07)

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	243	37	9	31	1	0	0	6	0	1	15	0	0	0	100
	244	63	6	3	18	0	0	1	0	0	9	0	0	0	100
	245	67	1	9	15	0	0	4	0	0	3	1	0	0	100
	Mean	55.67	5.33	14.33	11.33	.00	.00	3.67	.00	.33	9.00	.33	.00	.00	100.00
	StDev	16.29	4.04	14.74	9.07	.00	.00	2.52	.00	.58	6.00	.58	.00	.00	.00
Endocladia	240	13	2	0	38	0	22	0	3	0	22	0	0	0	100
	241	33	0	16	10	0	0	16	0	0	25	0	0	0	100
	242	33	12	10	20	0	0	2	0	0	22	1	0	0	100
	Mean	26.33	4.67	8.67	22.67	.00	7.33	6.00	1.00	.00	23.00	.33	.00	.00	100.00
	StDev	11.55	6.43	8.08	14.19	.00	12.70	8.72	1.73	.00	1.73	.58	.00	.00	.00
Silvetia (Rockweed)	53	18	0	3	2	0	2	52	6	0	17	0	0	0	100
	237	5	7	1	3	0	78	0	0	0	6	0	0	0	100
	469	4	0	3	1	0	41	2	0	0	49	0	0	0	100
	Mean	9.00	2.33	2.33	2.00	.00	40.33	18.00	2.00	.00	24.00	.00	.00	.00	100.00
	StDev	7.81	4.04	1.15	1.00	.00	38.00	29.46	3.46	.00	22.34	.00	.00	.00	.00
Mussels	476	5	0	0	0	0	0	90	0	0	5	0	0	0	100
	477	1	0	2	0	0	0	90	0	0	7	0	0	0	100
	478	2	0	2	0	0	0	89	0	0	4	3	0	0	100
	Mean	2.67	.00	1.33	.00	.00	.00	89.67	.00	.00	5.33	1.00	.00	.00	100.00
	StDev	2.08	.00	1.15	.00	.00	.00	.58	.00	.00	1.53	1.73	.00	.00	.00

Percent Cover of Index Species
Middle-West, Anacapa Island - spring 2007 (3/16/07)

	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
C	Chthamalus/Balanus	447	28	64	0	1	0	0	0	0	0	7	0	0	0	100
		448	24	16	0	17	0	0	15	2	0	24	2	0	0	100
		449	42	15	0	10	0	0	0	0	0	33	0	0	0	100
		450	48	20	0	14	0	0	0	0	0	18	0	0	0	100
		451	40	14	1	33	0	0	0	0	0	12	0	0	0	100
		Mean	36.40	25.80	.20	15.00	.00	.00	3.00	.40	.00	18.80	.40	.00	.00	100.00
		StDev	10.04	21.48	.45	11.73	.00	.00	6.71	.89	.00	10.18	.89	.00	.00	.00
	Endocladia	457	11	0	0	25	0	0	50	0	0	14	0	0	0	100
		458	45	3	3	16	0	0	26	0	1	5	1	0	0	100
		459	30	5	1	19	0	0	12	0	0	31	2	0	0	100
		460	43	28	0	13	0	0	0	0	0	16	0	0	0	100
		461	65	13	0	14	0	0	0	0	0	8	0	0	0	100
		Mean	38.80	9.80	.80	17.40	.00	.00	17.60	.00	.20	14.80	.60	.00	.00	100.00
		StDev	19.95	11.26	1.30	4.83	.00	.00	21.04	.00	.45	10.08	.89	.00	.00	.00
	Silvetia (Rockweed)	452	28	1	2	2	0	60	1	0	0	6	0	0	0	100
		453	19	1	2	0	0	65	1	0	0	12	0	0	0	100
		454	5	0	1	15	0	0	0	7	0	71	1	0	0	100
		455	22	0	1	7	0	40	9	4	0	12	5	0	0	100
		456	36	0	1	2	0	17	15	0	0	28	1	0	0	100
		Mean	22.00	.40	1.40	5.20	.00	36.40	5.20	2.20	.00	25.80	1.40	.00	.00	100.00
		StDev	11.51	.55	.55	6.06	.00	27.79	6.57	3.19	.00	26.56	2.07	.00	.00	.00
	Mussels	462	23	0	0	0	0	0	61	0	0	14	2	0	0	100
		463	25	0	2	0	0	0	50	0	0	21	2	0	0	100
		464	21	0	2	0	0	0	66	0	0	10	1	0	0	100
465		4	0	0	0	0	0	88	0	0	7	1	0	0	100	
466		1	0	0	0	0	0	98	0	0	1	0	0	0	100	
Mean		14.80	.00	.80	.00	.00	.00	72.60	.00	.00	10.60	1.20	.00	.00	100.00	
StDev		11.37	.00	1.10	.00	.00	.00	19.82	.00	.00	7.50	.84	.00	.00	.00	

Percent Cover of Index Species
S. Frenchy's Cove, Anacapa Island - spring 2007 (3/17/07)

		Bare Rock	Acorn Barnacle	Tetra-clita	Endo-cladia	Hespero-phycus	Silvetia	Mussels	Turf-weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total	
4	Chthamalus/Balanus	249	23	52	0	24	0	0	0	0	1	0	0	0	100	
		250	13	64	0	22	0	0	0	0	0	0	1	0	100	
		251	23	69	0	7	0	0	0	0	0	1	0	0	0	100
		252	25	65	0	8	0	0	0	0	0	0	2	0	0	100
		253	21	58	0	4	17	0	0	0	0	0	0	0	0	100
		Mean	21.00	61.60	.00	13.00	3.40	.00	.00	.00	.00	.40	.40	.20	.00	100.00
		StDev	4.69	6.66	.00	9.27	7.60	.00	.00	.00	.00	.55	.89	.45	.00	.00
		Endocladia	154	8	12	0	79	0	0	0	0	0	0	1	0	0
	155		5	0	0	75	0	18	0	0	0	2	0	0	0	100
	256		25	0	0	47	6	14	0	0	0	7	0	1	0	100
	257		8	0	0	88	0	0	0	0	0	4	0	0	0	100
	258		13	1	0	49	0	0	36	0	0	1	0	0	0	100
	Mean		11.80	2.60	.00	67.60	1.20	6.40	7.20	.00	.00	2.80	.20	.20	.00	100.00
	StDev		7.92	5.27	.00	18.51	2.68	8.88	16.10	.00	.00	2.77	.45	.45	.00	.00
	Silvetia (Rockweed)	259	13	5	0	0	0	59	0	0	0	22	1	0	0	100
		260	17	7	0	1	0	68	1	0	0	6	0	0	0	100
		261	26	8	0	0	0	42	0	0	0	24	0	0	0	100
		262	35	31	0	19	0	13	0	0	0	2	0	0	0	100
		263	9	5	0	0	0	80	0	0	0	6	0	0	0	100
		Mean	20.00	11.20	.00	4.00	.00	52.40	.20	.00	.00	12.00	.20	.00	.00	100.00
StDev		10.49	11.14	.00	8.40	.00	26.02	.45	.00	.00	10.20	.45	.00	.00	.00	
Mussels		201	15	0	0	0	0	0	58	7	0	19	1	0	0	100
		202	5	0	0	0	0	0	87	0	0	7	1	0	0	100
		264	10	0	0	0	0	0	72	4	0	12	2	0	0	100
		265	7	0	0	0	0	0	89	0	0	4	0	0	0	100
		266	20	0	0	0	0	0	65	4	0	11	0	0	0	100
	Mean	11.40	.00	.00	.00	.00	.00	74.20	3.00	.00	10.60	.80	.00	.00	100.00	
	StDev	6.11	.00	.00	.00	.00	.00	13.55	3.00	.00	5.68	.84	.00	.00	.00	

Percent Cover of Index Species

Crook Point, San Miguel Island - spring 2007 (5/19/07)

	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
C	Chthamalus/Balanus	137	59	41	0	0	0	0	0	0	0	0	0	0	0	100
		147	58	42	0	0	0	0	0	0	0	0	0	0	0	100
		148	32	68	0	0	0	0	0	0	0	0	0	0	0	100
		149	72	13	0	11	0	0	4	0	0	0	0	0	0	100
		495	34	59	0	7	0	0	0	0	0	0	0	0	0	100
		Mean	51.00	44.60	.00	3.60	.00	.00	.80	.00	.00	.00	.00	.00	.00	100.00
		StDev	17.35	21.05	.00	5.13	.00	.00	1.79	.00	.00	.00	.00	.00	.00	.00
	Endocladia	386	53	9	0	14	19	0	2	0	0	0	3	0	0	100
		387	55	0	2	31	0	0	0	2	0	10	0	0	0	100
		388	59	9	0	15	9	0	0	0	0	6	2	0	0	100
		389	20	4	2	20	5	0	45	0	1	3	0	0	0	100
		390	45	11	0	12	0	0	15	0	2	15	0	0	0	100
		Mean	46.40	6.60	.80	18.40	6.60	.00	12.40	.40	.60	6.80	1.00	.00	.00	100.00
		StDev	15.61	4.51	1.10	7.64	7.89	.00	19.27	.89	.89	5.89	1.41	.00	.00	.00
	Silvetia (Rockweed)	396	29	4	0	33	5	0	24	0	2	3	0	0	0	100
		397	3	0	0	0	0	0	92	0	0	5	0	0	0	100
		398	23	18	0	2	1	0	23	0	3	30	0	0	0	100
		399	33	1	0	0	0	2	0	11	0	51	0	0	2	100
		400	67	0	1	25	3	0	3	0	0	0	1	0	0	100
		Mean	31.00	4.60	.20	12.00	1.80	.40	28.40	2.20	1.00	17.80	.20	.00	.40	100.00
		StDev	23.19	7.67	.45	15.80	2.17	.89	37.23	4.92	1.41	22.08	.45	.00	.89	.00
	Mussels	381	26	2	0	0	0	0	63	0	2	7	0	0	0	100
		382	9	0	0	0	0	0	91	0	0	0	0	0	0	100
		383	6	0	0	0	0	0	90	0	0	4	0	0	0	100
		384	12	0	2	0	0	0	79	0	1	6	0	0	0	100
		385	23	0	0	0	0	0	65	0	1	11	0	0	0	100
		Mean	15.20	.40	.40	.00	.00	.00	77.60	.00	.80	5.60	.00	.00	.00	100.00
		StDev	8.81	.89	.89	.00	.00	.00	13.30	.00	.84	4.04	.00	.00	.00	.00

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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	34	66	0	0	0	0	0	0	0	0	0	0	0	100
	417	31	38	0	31	0	0	0	0	0	0	0	0	0	100
	418	20	63	0	16	0	0	1	0	0	0	0	0	0	100
	419	31	21	0	46	0	2	0	0	0	0	0	0	0	100
	420	18	11	0	71	0	0	0	0	0	0	0	0	0	100
	Mean	26.80	39.80	.00	32.80	.00	.40	.20	.00	.00	.00	.00	.00	.00	100.00
	StDev	7.26	24.55	.00	27.36	.00	.89	.45	.00	.00	.00	.00	.00	.00	.00
Endocladia	411	33	0	0	35	0	0	15	2	0	11	4	0	0	100
	412	23	15	0	24	0	0	34	0	0	4	0	0	0	100
	413	18	1	0	22	0	45	0	0	0	13	1	0	0	100
	414	38	0	0	46	0	0	1	1	0	14	0	0	0	100
	415	13	0	0	64	0	4	0	0	0	19	0	0	0	100
	Mean	25.00	3.20	.00	38.20	.00	9.80	10.00	.60	.00	12.20	1.00	.00	.00	100.00
	StDev	10.37	6.61	.00	17.33	.00	19.75	14.85	.89	.00	5.45	1.73	.00	.00	.00
Silvetia (Rockweed)	406	15	0	0	6	0	50	4	0	0	17	8	0	0	100
	407	14	0	0	0	0	72	0	0	0	13	1	0	0	100
	408	9	0	4	2	0	75	0	0	0	7	3	0	0	100
	409	7	0	0	2	0	82	0	0	0	7	2	0	0	100
	410	19	0	3	3	0	53	0	2	0	16	4	0	0	100
	Mean	12.80	.00	1.40	2.60	.00	66.40	.80	.40	.00	12.00	3.60	.00	.00	100.00
	StDev	4.82	.00	1.95	2.19	.00	14.12	1.79	.89	.00	4.80	2.70	.00	.00	.00
Mussels	401	25	3	8	0	0	0	31	0	6	11	16	0	0	100
	402	7	0	1	0	0	0	73	3	0	6	10	0	0	100
	403	7	0	3	0	0	0	77	1	3	3	6	0	0	100
	404	34	0	16	0	0	0	23	6	3	6	12	0	0	100
	405	36	0	5	0	0	46	0	3	4	2	4	0	0	100
	Mean	21.80	.60	6.60	.00	.00	9.20	40.80	2.60	3.20	5.60	9.60	.00	.00	100.00
	StDev	14.13	1.34	5.86	.00	.00	20.57	33.26	2.30	2.17	3.51	4.77	.00	.00	.00

Percent Cover of Index Species

Harris Point, San Miguel Island - spring 2007 (5/18/07)

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	17	58	0	19	5	0	0	0	0	0	1	0	0	100
	441	20	78	0	2	0	0	0	0	0	0	0	0	0	100
	442	18	71	0	11	0	0	0	0	0	0	0	0	0	100
	443	31	61	0	0	0	0	0	0	0	0	0	8	0	100
	444	39	55	0	6	0	0	0	0	0	0	0	0	0	100
	Mean	25.00	64.60	.00	7.60	1.00	.00	.00	.00	.00	.00	.20	1.60	.00	100.00
	StDev	9.62	9.61	.00	7.64	2.24	.00	.00	.00	.00	.00	.45	3.58	.00	.00
Endocladia	431	39	1	0	45	0	0	10	0	0	5	0	0	0	100
	432	8	20	0	48	11	0	4	0	0	9	0	0	0	100
	433	18	11	0	63	7	0	1	0	0	0	0	0	0	100
	434	20	0	1	65	11	0	0	0	0	0	3	0	0	0
	435	3	0	0	35	50	0	0	0	0	12	0	0	0	100
	Mean	17.60	6.40	.20	51.20	15.80	.00	3.00	.00	.00	5.80	.00	.00	.00	100.00
	StDev	13.87	8.91	.45	12.66	19.64	.00	4.24	.00	.00	4.76	.00	.00	.00	.00
Mussels	426	17	0	0	5	0	0	59	0	3	15	1	0	0	100
	427	31	0	0	20	6	0	0	5	0	38	0	0	0	100
	428	57	0	0	9	2	0	0	0	0	31	1	0	0	100
	429	38	2	4	0	0	0	45	0	0	11	0	0	0	100
	430	12	1	1	0	0	0	68	0	0	18	0	0	0	100
	Mean	31.00	.60	1.00	6.80	1.60	.00	34.40	1.00	.60	22.60	.40	.00	.00	100.00
	StDev	17.90	.89	1.73	8.29	2.61	.00	32.45	2.24	1.34	11.41	.55	.00	.00	.00
Tetraclita	436	25	0	17	0	0	0	50	0	0	8	0	0	0	100
	437	24	0	21	0	0	0	36	0	0	17	2	0	0	100
	438	13	0	1	4	0	0	0	21	0	61	0	0	0	100
	439	17	0	1	10	0	0	0	17	0	55	0	0	0	100
	445	41	0	16	2	0	0	20	8	0	10	3	0	0	100
	Mean	24.00	.00	11.20	3.20	.00	.00	21.20	9.20	.00	30.20	1.00	.00	.00	100.00
	StDev	10.72	.00	9.50	4.15	.00	.00	22.07	9.63	.00	25.68	1.41	.00	.00	.00
Hesperophycus	421	21	0	0	27	52	0	0	0	0	0	0	0	0	100
	422	23	1	0	38	26	0	0	1	0	10	1	0	0	100
	423	13	0	0	66	20	0	0	0	0	1	0	0	0	100
	424	8	0	0	24	68	0	0	0	0	0	0	0	0	100
	425	31	0	0	7	60	0	0	0	0	2	0	0	0	100
	Mean	19.20	.20	.00	32.40	45.20	.00	.00	.20	.00	2.60	.20	.00	.00	100.00
	StDev	8.96	.45	.00	21.82	21.15	.00	.00	.45	.00	4.22	.45	.00	.00	.00

Percent Cover of Index Species

Otter Harbor, San Miguel Island - spring 2007 (5/20/07)

	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	75	24	0	0	0	0	0	0	0	1	0	0	0	100
		371	9	85	0	0	0	0	0	0	0	0	0	6	0	100
		372	51	49	0	0	0	0	0	0	0	0	0	0	0	100
		373	30	68	0	0	0	0	0	0	0	0	0	2	0	100
		374	1	0	0	0	0	0	0	24	0	75	0	0	0	100
		Mean	33.20	45.20	.00	.00	.00	.00	.00	4.80	.00	15.20	.00	1.60	.00	100.00
		StDev	30.40	33.95	.00	.00	.00	.00	.00	10.73	.00	33.43	.00	2.61	.00	.00
	Endocladia	360	32	18	4	32	0	7	4	1	0	2	0	0	0	100
		361	60	0	0	38	0	0	0	0	0	0	2	0	0	100
		362	0	0	0	88	0	0	0	0	1	11	0	0	0	100
		363	21	0	0	40	0	3	0	0	0	35	1	0	0	100
		364	10	0	0	58	1	16	0	0	0	15	0	0	0	100
		Mean	24.60	3.60	.80	51.20	.20	5.20	.80	.20	.20	12.60	.60	.00	.00	100.00
		StDev	23.13	8.05	1.79	22.74	.45	6.69	1.79	.45	.45	13.97	.89	.00	.00	.00
	Silvetia (Rockweed)	355	48	15	1	1	0	0	0	0	0	32	1	2	0	100
		356	20	0	1	39	0	32	0	0	0	8	0	0	0	100
		357	26	0	0	49	0	10	0	0	0	15	0	0	0	100
		358	20	44	0	22	0	0	0	0	0	14	0	0	0	100
		359	20	59	0	15	0	0	0	0	0	3	0	3	0	100
		Mean	26.80	23.60	.40	25.20	.00	8.40	.00	.00	.00	14.40	.20	1.00	.00	100.00
		StDev	12.13	26.73	.55	19.08	.00	13.89	.00	.00	.00	10.97	.45	1.41	.00	.00
	Mussels	375	33	0	0	0	0	0	49	0	9	7	2	0	0	100
		376	33	0	2	0	0	0	49	0	1	12	3	0	0	100
		378	24	0	0	1	0	0	50	0	10	15	0	0	0	100
		379	32	0	1	0	0	0	45	0	6	15	1	0	0	100
		380	27	0	1	0	0	0	45	0	2	23	2	0	0	100
		Mean	29.80	.00	.80	.20	.00	.00	47.60	.00	5.60	14.40	1.60	.00	.00	100.00
		StDev	4.09	.00	.84	.45	.00	.00	2.41	.00	4.04	5.81	1.14	.00	.00	.00

Percent Cover of Index Species

Fraser Cove, Santa Cruz Island - spring 2007 (3/26/07)

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	876	18	23	0	16	0	0	3	0	1	39	0	0	0	100
	877	8	7	0	8	0	0	0	0	0	77	0	0	0	100
	878	18	80	0	2	0	0	0	0	0	0	0	0	0	100
	879	51	45	0	2	0	0	0	0	0	0	0	2	0	100
	880	20	34	0	1	0	1	0	0	0	42	1	1	0	100
	Mean	23.00	37.80	.00	5.80	.00	.20	.60	.00	.20	31.60	.20	.60	.00	100.00
	StDev	16.34	27.45	.00	6.34	.00	.45	1.34	.00	.45	32.49	.45	.89	.00	.00
Endocladia	881	19	0	0	54	0	0	6	0	0	21	0	0	0	100
	882	29	4	0	60	0	0	3	0	0	3	1	0	0	100
	883	9	0	0	81	8	0	2	0	0	0	0	0	0	100
	884	29	7	0	63	0	0	0	0	0	1	0	0	0	100
	885	9	3	0	83	0	0	0	0	0	4	0	1	0	100
	Mean	19.00	2.80	.00	68.20	1.60	.00	2.20	.00	.00	5.80	.20	.20	.00	100.00
	StDev	10.00	2.95	.00	13.03	3.58	.00	2.49	.00	.00	8.64	.45	.45	.00	.00
Silvetia (Rockweed)	896	13	7	0	27	9	36	0	0	0	8	0	0	0	100
	897	18	5	0	8	8	49	0	1	0	8	3	0	0	100
	898	19	3	0	1	0	61	0	0	0	16	0	0	0	100
	899	19	18	0	7	3	44	0	0	0	6	3	0	0	100
	900	10	14	0	2	15	59	0	0	0	0	0	0	0	100
	Mean	15.80	9.40	.00	9.00	7.00	49.80	.00	.20	.00	7.60	1.20	.00	.00	100.00
	StDev	4.09	6.35	.00	10.51	5.79	10.43	.00	.45	.00	5.73	1.64	.00	.00	.00
Mussels	891	10	0	0	0	0	0	71	1	0	12	6	0	0	100
	892	26	0	0	0	0	0	66	0	0	7	1	0	0	100
	893	16	0	0	0	0	0	83	0	0	0	1	0	0	100
	894	20	0	0	0	0	0	77	0	0	1	2	0	0	100
	895	16	0	0	0	0	0	79	0	0	4	1	0	0	100
	Mean	17.60	.00	.00	.00	.00	.00	75.20	.20	.00	4.80	2.20	.00	.00	100.00
	StDev	5.90	.00	.00	.00	.00	.00	6.72	.45	.00	4.87	2.17	.00	.00	.00
Pollicipes	901	27	2	2	0	0	0	64	0	1	2	2	0	0	100
	902	44	0	0	15	0	0	7	0	1	8	25	0	0	100
	903	18	0	0	0	0	0	54	0	10	1	17	0	0	100
	904	11	0	1	0	0	0	76	0	5	1	6	0	0	100
	905	14	0	0	0	0	0	61	0	10	1	14	0	0	100
	Mean	22.80	.40	.60	3.00	.00	.00	52.40	.00	5.40	2.60	12.80	.00	.00	100.00
	StDev	13.29	.89	.89	6.71	.00	.00	26.60	.00	4.51	3.05	9.09	.00	.00	.00

Percent Cover of Index Species
Fraser Cove, Santa Cruz Island - spring 2007 (3/26/07)(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	24	35	0	0	0	0	0	0	0	0	0	41	0	100
	907	26	29	0	0	0	0	0	0	0	5	0	40	0	100
	908	16	34	0	0	0	0	0	0	0	3	0	47	0	100
	909	23	21	0	0	0	0	0	0	0	12	0	44	0	100
	910	18	22	0	0	0	0	0	0	0	2	0	58	0	100
	Mean	21.40	28.20	.00	.00	.00	.00	.00	.00	.00	4.40	.00	46.00	.00	100.00
	StDev	4.22	6.53	.00	.00	.00	.00	.00	.00	.00	4.62	.00	7.25	.00	.00
Hesperophycus	886	28	2	0	6	63	1	0	0	0	0	0	0	0	100
	887	42	2	0	5	41	0	0	0	0	10	0	0	0	100
	888	19	20	0	27	33	1	0	0	0	0	0	0	0	100
	889	44	16	0	10	26	2	0	0	0	2	0	0	0	100
	890	12	5	0	24	26	33	0	0	0	0	0	0	0	100
	Mean	29.00	9.00	.00	14.40	37.80	7.40	.00	.00	.00	2.40	.00	.00	.00	100.00
	StDev	14.00	8.43	.00	10.36	15.39	14.33	.00	.00	.00	4.34	.00	.00	.00	.00

Percent Cover of Index Species
Orizaba Cove, Santa Cruz Island - spring 2007 (3/15/07)

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	851	56	28	8	1	0	0	2	0	0	5	0	0	0	100
	852	12	84	0	1	0	0	0	0	0	2	1	0	0	100
	853	29	67	0	0	0	0	3	0	0	1	0	0	0	100
	854	29	50	3	0	0	0	14	0	0	4	0	0	0	100
	855	12	71	0	1	0	0	2	0	0	14	0	0	0	100
	Mean	27.60	60.00	2.20	.60	.00	.00	4.20	.00	.00	5.20	.20	.00	.00	100.00
	StDev	18.01	21.62	3.49	.55	.00	.00	5.59	.00	.00	5.17	.45	.00	.00	.00
Silvetia (Rockweed)	866	18	0	10	6	7	1	39	0	0	19	0	0	0	100
	867	1	0	0	11	39	31	5	0	0	13	0	0	0	100
	868	9	0	2	7	29	16	15	0	0	22	0	0	0	100
	869	16	0	2	16	5	46	0	0	0	15	0	0	0	100
	870	11	0	3	19	31	24	0	0	0	12	0	0	0	100
	Mean	11.00	.00	3.40	11.80	22.20	23.60	11.80	.00	.00	16.20	.00	.00	.00	100.00
	StDev	6.67	.00	3.85	5.63	15.27	16.77	16.39	.00	.00	4.21	.00	.00	.00	.00
Mussels	861	16	0	6	0	0	0	57	0	0	21	0	0	0	100
	862	1	0	3	0	0	0	85	0	0	9	2	0	0	100
	863	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	864	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	865	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	Mean	3.40	.00	1.80	.00	.00	.00	88.40	.00	.00	6.00	.40	.00	.00	100.00
	StDev	7.06	.00	2.68	.00	.00	.00	18.72	.00	.00	9.25	.89	.00	.00	.00
Tetraclita	871	3	0	7	0	0	0	89	0	0	0	1	0	0	100
	872	0	0	8	0	0	0	91	0	0	1	0	0	0	100
	873	21	0	32	4	0	2	34	0	0	6	1	0	0	100
	874	17	0	14	0	0	0	62	0	0	7	0	0	0	100
	875	24	0	18	0	0	0	51	0	1	5	1	0	0	100
	Mean	13.00	.00	15.80	.80	.00	.40	65.40	.00	.20	3.80	.60	.00	.00	100.00
	StDev	10.84	.00	10.11	1.79	.00	.89	24.58	.00	.45	3.11	.55	.00	.00	.00
Hesperophycus	856	6	22	1	46	9	0	7	1	0	8	0	0	0	100
	857	13	8	2	24	17	11	13	0	0	11	1	0	0	100
	858	2	0	0	21	49	14	2	0	0	12	0	0	0	100
	859	1	18	0	28	10	0	38	5	0	0	0	0	0	100
	860	1	0	0	35	62	0	0	0	0	2	0	0	0	100
	Mean	4.60	9.60	.60	30.80	29.40	5.00	12.00	1.20	.00	6.60	.20	.00	.00	100.00
	StDev	5.13	10.14	.89	9.98	24.46	6.93	15.38	2.17	.00	5.37	.45	.00	.00	.00

Percent Cover of Index Species

Prisoner's Harbor, Santa Cruz Island - spring 2007 (3/25/07)

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	826	42	0	0	0	0	0	0	0	0	58	0	0	0	100
	827	37	21	0	4	0	0	1	14	0	23	0	0	0	100
	828	16	15	1	55	0	0	1	7	0	4	1	0	0	100
	829	38	13	1	36	0	0	2	9	0	1	0	0	0	100
	830	33	14	0	32	0	0	0	8	0	10	3	0	0	100
	Mean	33.20	12.60	.40	25.40	.00	.00	.80	7.60	.00	19.20	.80	.00	.00	100.00
	StDev	10.13	7.70	.55	23.10	.00	.00	.84	5.03	.00	23.27	1.30	.00	.00	.00
Endocladia	831	41	2	0	36	0	0	0	0	0	19	2	0	0	100
	832	28	0	0	55	11	0	1	0	0	2	3	0	0	100
	833	34	10	0	54	1	0	0	0	0	1	0	0	0	100
	834	30	8	0	55	3	0	0	0	0	0	4	0	0	100
	835	17	3	1	38	29	0	5	0	0	4	3	0	0	100
	Mean	30.00	4.60	.20	47.60	8.80	.00	1.20	.00	.00	5.20	2.40	.00	.00	100.00
	StDev	8.80	4.22	.45	9.71	12.09	.00	2.17	.00	.00	7.85	1.52	.00	.00	.00
Silvetia (Rockweed)	846	31	13	1	31	0	0	1	6	0	17	0	0	0	100
	847	49	19	2	3	0	0	2	5	0	19	1	0	0	100
	848	43	1	1	0	0	3	6	1	0	43	2	0	0	100
	849	22	0	3	1	0	35	8	0	0	30	1	0	0	100
	850	10	0	5	0	0	51	1	0	0	33	0	0	0	100
	Mean	31.00	6.60	2.40	7.00	.00	17.80	3.60	2.40	.00	28.40	.80	.00	.00	100.00
	StDev	15.73	8.85	1.67	13.47	.00	23.72	3.21	2.88	.00	10.67	.84	.00	.00	.00
Mussels	841	0	0	0	0	0	0	99	0	0	1	0	0	0	100
	842	1	0	0	0	0	0	99	0	0	0	0	0	0	100
	843	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	844	6	0	0	0	0	0	90	0	0	4	0	0	0	100
	845	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	Mean	1.40	.00	.00	.00	.00	.00	97.60	.00	.00	1.00	.00	.00	.00	100.00
	StDev	2.61	.00	.00	.00	.00	.00	4.28	.00	.00	1.73	.00	.00	.00	.00
Hesperophycus	836	37	5	0	26	14	0	1	0	0	14	3	0	0	100
	837	15	21	0	15	25	0	1	0	0	23	0	0	0	100
	838	26	7	0	21	9	0	1	1	0	34	1	0	0	100
	839	33	21	0	22	20	3	0	0	0	1	0	0	0	100
	840	35	23	0	19	14	1	1	0	0	6	1	0	0	100
	Mean	29.20	15.40	.00	20.60	16.40	.80	.80	.20	.00	15.60	1.00	.00	.00	100.00
	StDev	8.96	8.65	.00	4.04	6.19	1.30	.45	.45	.00	13.24	1.22	.00	.00	.00

Percent Cover of Index Species

Scorpion Rock, Santa Cruz Island - spring 2007 (3/14/07)

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	801	27	5	0	61	0	0	4	0	0	0	3	0	0	100
	802	33	29	2	36	0	0	0	0	0	0	0	0	0	100
	803	42	0	0	54	0	0	0	0	2	2	0	0	0	100
	804	33	30	0	29	0	0	0	0	0	7	1	0	0	100
	805	36	59	0	4	0	0	0	0	0	0	1	0	0	100
	Mean	34.20	24.60	.40	36.80	.00	.00	.80	.00	.40	1.80	1.00	.00	.00	100.00
	StDev	5.45	23.56	.89	22.47	.00	.00	1.79	.00	.89	3.03	1.22	.00	.00	.00
Endocladia	806	4	2	0	71	0	0	4	0	0	19	0	0	0	100
	807	3	0	1	57	0	0	4	0	2	33	0	0	0	100
	808	14	0	1	56	0	0	10	0	2	17	0	0	0	100
	809	14	0	0	77	0	0	1	0	0	7	1	0	0	100
	810	14	0	0	72	0	0	1	0	1	12	0	0	0	100
	Mean	9.80	.40	.40	66.60	.00	.00	4.00	.00	1.00	17.60	.20	.00	.00	100.00
	StDev	5.76	.89	.55	9.50	.00	.00	3.67	.00	1.00	9.79	.45	.00	.00	.00
Mussels	816	30	0	22	0	0	0	31	1	1	15	0	0	0	100
	817	9	0	11	0	0	0	32	15	0	31	2	0	0	100
	818	20	0	27	0	0	0	47	0	1	3	2	0	0	100
	819	15	0	34	1	0	0	41	0	1	7	1	0	0	100
	820	13	0	30	0	0	0	39	1	0	16	1	0	0	100
	Mean	17.40	.00	24.80	.20	.00	.00	38.00	3.40	.60	14.40	1.20	.00	.00	100.00
	StDev	8.08	.00	8.87	.45	.00	.00	6.63	6.50	.55	10.76	.84	.00	.00	.00
Tetraclita	821	41	0	20	13	0	0	17	0	1	7	1	0	0	100
	822	47	0	0	6	2	0	40	0	0	5	0	0	0	100
	823	68	0	23	3	0	0	1	0	0	4	1	0	0	100
	824	76	0	15	1	0	0	1	0	0	2	5	0	0	100
	825	72	0	18	0	0	0	1	0	0	7	2	0	0	100
	Mean	60.80	.00	15.20	4.60	.40	.00	12.00	.00	.20	5.00	1.80	.00	.00	100.00
	StDev	15.74	.00	8.98	5.22	.89	.00	17.12	.00	.45	2.12	1.92	.00	.00	.00
Hesperophycus	811	28	0	0	20	48	0	1	0	0	3	0	0	0	100
	812	18	0	0	26	46	3	1	0	0	6	0	0	0	100
	813	3	0	0	23	42	29	0	0	0	3	0	0	0	100
	814	73	0	0	17	4	3	0	0	0	3	0	0	0	100
	815	9	0	0	11	50	23	0	0	0	7	0	0	0	100
	Mean	26.20	.00	.00	19.40	38.00	11.60	.40	.00	.00	4.40	.00	.00	.00	100.00
	StDev	27.82	.00	.00	5.77	19.24	13.37	.55	.00	.00	1.95	.00	.00	.00	.00

Percent Cover of Index Species
Trailer, Santa Cruz Island - spring 2007 (3/27/07)

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	911	47	18	0	24	0	0	0	0	0	11	0	0	0	100
	912	17	81	0	0	0	0	0	0	0	0	2	0	0	100
	913	31	51	0	16	0	0	0	0	0	2	0	0	0	100
	914	12	85	0	0	0	0	0	0	0	0	3	0	0	100
	915	36	57	1	0	0	0	0	0	0	0	6	0	0	100
	Mean	28.60	58.40	.20	8.00	.00	.00	.00	.00	.00	2.60	2.20	.00	.00	100.00
	StDev	14.22	26.96	.45	11.31	.00	.00	.00	.00	.00	4.77	2.49	.00	.00	.00
Silvetia (Rockweed)	926	4	1	0	1	0	89	0	0	0	5	0	0	0	100
	927	23	25	0	0	0	51	0	0	0	1	0	0	0	100
	928	14	8	0	5	0	68	0	0	0	5	0	0	0	100
	929	5	0	0	0	0	91	0	0	0	4	0	0	0	100
	930	8	0	0	0	0	88	0	0	0	4	0	0	0	100
	Mean	10.80	6.80	.00	1.20	.00	77.40	.00	.00	.00	3.80	.00	.00	.00	100.00
	StDev	7.85	10.71	.00	2.17	.00	17.44	.00	.00	.00	1.64	.00	.00	.00	.00
Mussels	921	16	0	0	0	0	0	7	3	0	25	49	0	0	100
	922	10	0	0	0	0	0	59	1	1	17	12	0	0	100
	923	12	0	0	0	0	0	40	0	0	40	8	0	0	100
	924	12	0	0	0	0	0	64	1	0	15	8	0	0	100
	925	24	0	1	0	0	0	55	0	0	12	8	0	0	100
	Mean	14.80	.00	.20	.00	.00	.00	45.00	1.00	.20	21.80	17.00	.00	.00	100.00
	StDev	5.59	.00	.45	.00	.00	.00	23.05	1.22	.45	11.26	17.97	.00	.00	.00
Hesperophycus	916	25	8	0	18	17	30	0	0	0	1	0	1	0	100
	917	9	6	0	22	9	52	0	0	0	0	0	2	0	100
	918	7	0	0	7	25	61	0	0	0	0	0	0	0	100
	919	40	52	0	7	0	0	0	0	0	0	0	1	0	100
	920	17	18	0	40	14	7	0	0	0	4	0	0	0	100
	951	33	36	0	10	0	21	0	0	0	0	0	0	0	100
	Mean	21.83	20.00	.00	17.33	10.83	28.50	.00	.00	.00	.83	.00	.67	.00	100.00
	StDev	13.21	20.12	.00	12.68	9.87	24.25	.00	.00	.00	1.60	.00	.82	.00	.00

Percent Cover of Index Species

Willows Anchorage, Santa Cruz Island - spring 2007 (3/28/07)

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
Endocladia	931	23	0	0	76	0	0	0	0	0	1	0	0	0	100
	932	31	1	0	67	0	0	0	0	0	1	0	0	0	100
	933	36	5	0	58	0	0	0	0	0	0	1	0	0	100
	934	22	1	0	70	0	0	0	0	0	6	1	0	0	100
	935	32	17	2	44	0	0	0	0	0	5	0	0	0	100
	Mean	28.80	4.80	.40	63.00	.00	.00	.00	.00	.00	2.60	.40	.00	.00	100.00
	StDev	6.06	7.09	.89	12.45	.00	.00	.00	.00	.00	2.70	.55	.00	.00	.00
Silvetia (Rockweed)	946	9	20	0	46	0	0	0	0	0	25	0	0	0	100
	947	24	8	0	31	0	0	0	0	0	30	7	0	0	100
	948	18	18	0	0	0	40	0	1	0	18	5	0	0	100
	949	1	0	0	0	0	90	0	0	0	9	0	0	0	100
	950	26	36	0	18	0	0	0	0	0	19	1	0	0	100
	Mean	15.60	16.40	.00	19.00	.00	26.00	.00	.20	.00	20.20	2.60	.00	.00	100.00
	StDev	10.50	13.59	.00	19.97	.00	39.75	.00	.45	.00	7.92	3.21	.00	.00	.00
Mussels	941	9	0	2	0	0	0	82	0	1	2	2	0	2	100
	942	1	0	0	0	0	0	97	0	0	1	1	0	0	100
	943	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	944	3	0	3	0	0	0	93	0	0	1	0	0	0	100
	945	7	0	1	0	0	0	87	0	1	3	1	0	0	100
	Mean	4.00	.00	1.20	.00	.00	.00	91.80	.00	.40	1.40	.80	.00	.40	100.00
	StDev	3.87	.00	1.30	.00	.00	.00	7.33	.00	.55	1.14	.84	.00	.89	.00
Hesperophycus	936	9	17	0	71	0	0	0	0	0	3	0	0	0	100
	937	32	44	0	0	0	0	0	0	0	22	2	0	0	100
	938	43	34	0	3	0	0	0	0	0	20	0	0	0	100
	939	13	4	0	1	4	61	0	0	0	17	0	0	0	100
	940	9	20	0	9	3	34	0	0	0	25	0	0	0	100
	Mean	21.20	23.80	.00	16.80	1.40	19.00	.00	.00	.00	17.40	.40	.00	.00	100.00
	StDev	15.47	15.53	.00	30.50	1.95	27.71	.00	.00	.00	8.56	.89	.00	.00	.00

Percent Cover of Index Species

East Point, Santa Rosa Island - spring 2007 (4/11/07)

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	575	43	57	0	0	0	0	0	0	0	0	0	0	0	100
	576	25	43	0	17	11	0	0	0	0	2	2	0	0	100
	577	22	18	0	45	8	7	0	0	0	0	0	0	0	100
	578	39	61	0	0	0	0	0	0	0	0	0	0	0	100
	579	8	87	0	5	0	0	0	0	0	0	0	0	0	100
	Mean	27.40	53.20	.00	13.40	3.80	1.40	.00	.00	.00	.40	.40	.00	.00	100.00
	StDev	14.05	25.30	.00	18.98	5.31	3.13	.00	.00	.00	.89	.89	.00	.00	.00
Endocladia	580	29	1	0	66	4	0	0	0	0	0	0	0	0	100
	581	15	1	0	75	9	0	0	0	0	0	0	0	0	100
	582	17	0	0	73	9	0	0	0	0	1	0	0	0	100
	583	25	0	0	74	1	0	0	0	0	0	0	0	0	100
	584	17	1	0	54	26	0	0	0	0	2	0	0	0	100
	Mean	20.60	.60	.00	68.40	9.80	.00	.00	.00	.00	.60	.00	.00	.00	100.00
	StDev	6.07	.55	.00	8.79	9.68	.00	.00	.00	.00	.89	.00	.00	.00	.00
Silvetia (Rockweed)	585	52	8	0	12	0	17	0	0	0	11	0	0	0	100
	586	35	0	0	13	3	29	0	0	0	16	4	0	0	100
	587	56	4	0	3	5	14	0	0	0	18	0	0	0	100
	588	3	0	0	3	0	84	0	0	0	10	0	0	0	100
	589	14	0	0	0	0	0	60	0	0	26	0	0	0	100
	Mean	32.00	2.40	.00	6.20	1.60	28.80	12.00	.00	.00	16.20	.80	.00	.00	100.00
	StDev	23.18	3.58	.00	5.89	2.30	32.54	26.83	.00	.00	6.42	1.79	.00	.00	.00
Mussels	590	4	1	0	0	0	0	83	0	1	6	5	0	0	100
	591	8	6	0	0	0	0	49	4	0	33	0	0	0	100
	592	1	0	0	0	0	0	84	3	0	12	0	0	0	100
	593	3	0	0	0	0	0	95	0	0	2	0	0	0	100
	594	9	0	0	0	0	0	89	0	0	2	0	0	0	100
	Mean	5.00	1.40	.00	.00	.00	.00	80.00	1.40	.20	11.00	1.00	.00	.00	100.00
	StDev	3.39	2.61	.00	.00	.00	.00	17.97	1.95	.45	12.96	2.24	.00	.00	.00
Hesperophycus	570	26	0	0	68	5	0	0	0	0	1	0	0	0	100
	571	29	8	0	40	22	0	1	0	0	0	0	0	0	100
	572	18	4	0	37	40	0	0	0	0	0	1	0	0	100
	573	10	7	0	56	25	1	0	0	0	1	0	0	0	100
	574	15	4	0	42	34	4	0	0	0	1	0	0	0	100
	Mean	19.60	4.60	.00	48.60	25.20	1.00	.20	.00	.00	.60	.20	.00	.00	100.00
	StDev	7.83	3.13	.00	13.07	13.37	1.73	.45	.00	.00	.55	.45	.00	.00	.00

Percent Cover of Index Species

Ford Point, Santa Rosa Island - spring 2007 (4/15/07)

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	520	57	39	0	0	0	0	0	0	0	0	4	0	0	100
	521	51	46	0	0	0	0	1	0	0	2	0	0	0	100
	522	52	46	0	0	0	0	0	0	0	0	2	0	0	100
	523	54	4	0	41	0	0	0	0	0	0	1	0	0	100
	524	31	68	0	1	0	0	0	0	0	0	0	0	0	100
	Mean	49.00	40.60	.00	8.40	.00	.00	.20	.00	.00	.40	1.40	.00	.00	100.00
	StDev	10.32	23.19	.00	18.23	.00	.00	.45	.00	.00	.89	1.67	.00	.00	.00
Endocladia	525	28	0	0	58	0	0	10	0	0	2	2	0	0	100
	526	35	0	0	50	0	0	9	0	0	6	0	0	0	100
	527	63	0	1	19	0	0	3	0	0	11	3	0	0	100
	528	39	0	0	40	0	0	0	3	0	14	4	0	0	100
	529	44	0	0	43	0	0	1	2	0	8	2	0	0	100
	Mean	41.80	.00	.20	42.00	.00	.00	4.60	1.00	.00	8.20	2.20	.00	.00	100.00
	StDev	13.22	.00	.45	14.61	.00	.00	4.62	1.41	.00	4.60	1.48	.00	.00	.00
Mussels	530	73	0	0	1	0	0	20	0	1	0	5	0	0	100
	531	8	0	0	0	0	0	87	0	1	2	2	0	0	100
	532	2	1	0	0	0	0	38	8	0	29	22	0	0	100
	533	29	0	0	0	0	0	67	0	1	2	1	0	0	100
	534	27	0	0	0	0	0	0	37	0	19	17	0	0	100
	Mean	27.80	.20	.00	.20	.00	.00	42.40	9.00	.60	10.40	9.40	.00	.00	100.00
	StDev	27.85	.45	.00	.45	.00	.00	35.05	16.03	.55	12.93	9.50	.00	.00	.00

Percent Cover of Index Species

Fossil Reef, Santa Rosa Island - spring 2007 (4/13/07)

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	605	44	54	0	0	0	0	0	0	0	1	1	0	0	100
	606	45	47	0	0	0	0	0	0	0	3	0	5	0	100
	607	41	55	0	1	0	0	0	0	0	0	3	0	0	100
	608	76	21	0	0	0	0	0	0	0	3	0	0	0	100
	609	66	29	0	0	0	0	0	0	0	4	1	0	0	100
	Mean	54.40	41.20	.00	.20	.00	.00	.00	.00	.00	2.20	1.00	1.00	.00	100.00
	StDev	15.63	15.37	.00	.45	.00	.00	.00	.00	.00	1.64	1.22	2.24	.00	.00
Endocladia	610	23	36	0	39	0	0	0	0	0	1	1	0	0	100
	611	10	47	0	41	0	1	0	0	0	1	0	0	0	100
	612	46	43	8	0	0	0	0	0	0	2	1	0	0	100
	613	23	7	0	32	0	36	0	0	0	2	0	0	0	100
	614	44	37	0	15	0	0	0	0	0	3	1	0	0	100
	Mean	29.20	34.00	1.60	25.40	.00	7.40	.00	.00	.00	1.80	.60	.00	.00	100.00
	StDev	15.39	15.75	3.58	17.50	.00	15.99	.00	.00	.00	.84	.55	.00	.00	.00
Silvetia (Rockweed)	615	23	51	0	19	0	1	0	0	0	3	3	0	0	100
	616	38	20	0	31	0	1	0	0	0	10	0	0	0	100
	617	29	10	0	15	0	44	0	0	0	2	0	0	0	100
	618	14	0	0	9	0	74	0	0	0	3	0	0	0	100
	619	7	1	0	0	0	89	0	0	0	2	1	0	0	100
	Mean	22.20	16.40	.00	14.80	.00	41.80	.00	.00	.00	4.00	.80	.00	.00	100.00
	StDev	12.19	20.96	.00	11.54	.00	40.62	.00	.00	.00	3.39	1.30	.00	.00	.00
Mussels	620	8	0	1	0	0	0	10	2	0	38	41	0	0	100
	621	25	0	8	0	0	0	1	3	0	55	8	0	0	100
	622	24	0	8	0	0	0	43	0	0	24	1	0	0	100
	623	22	0	9	0	0	0	48	6	0	13	2	0	0	100
	624	8	0	0	0	0	0	1	35	0	15	41	0	0	100
	Mean	17.40	.00	5.20	.00	.00	.00	20.60	9.20	.00	29.00	18.60	.00	.00	100.00
	StDev	8.65	.00	4.32	.00	.00	.00	23.09	14.58	.00	17.56	20.62	.00	.00	.00

Percent Cover of Index Species

Johnson's Lee, Santa Rosa Island - spring 2007 (4/12/07)

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	500	36	64	0	0	0	0	0	0	0	0	0	0	0	100
	501	42	57	0	0	0	0	0	0	0	0	1	0	0	100
	502	52	46	0	0	0	0	0	0	0	0	2	0	0	100
	503	58	34	0	7	0	0	0	0	0	0	1	0	0	100
	504	90	8	0	0	0	0	1	0	0	1	0	0	0	100
	Mean	55.60	41.80	.00	1.40	.00	.00	.20	.00	.00	.20	.80	.00	.00	100.00
	StDev	21.04	22.05	.00	3.13	.00	.00	.45	.00	.00	.45	.84	.00	.00	.00
Endocladia	505	58	0	0	23	0	0	19	0	0	0	0	0	0	100
	506	73	1	0	26	0	0	0	0	0	0	0	0	0	100
	507	41	0	1	44	0	0	12	0	0	2	0	0	0	100
	508	37	5	0	31	0	0	23	0	2	0	2	0	0	100
	509	65	0	0	33	0	0	0	0	0	0	2	0	0	100
	Mean	54.80	1.20	.20	31.40	.00	.00	10.80	.00	.40	.40	.80	.00	.00	100.00
	StDev	15.43	2.17	.45	8.08	.00	.00	10.62	.00	.89	.89	1.10	.00	.00	.00
Mussels	510	2	0	0	0	0	0	0	5	0	84	9	0	0	100
	511	14	0	0	0	0	0	0	13	0	63	10	0	0	100
	512	33	0	0	0	0	0	59	0	3	1	4	0	0	100
	513	71	0	0	0	0	0	0	9	0	3	3	0	14	100
	514	5	0	0	0	0	0	0	21	0	28	4	0	42	100
	Mean	25.00	.00	.00	.00	.00	.00	11.80	9.60	.60	35.80	6.00	.00	11.20	100.00
	StDev	28.42	.00	.00	.00	.00	.00	26.39	7.99	1.34	36.78	3.24	.00	18.25	.00

Percent Cover of Index Species
Northwest-Talcott, Santa Rosa Island - spring 2007 (4/14/07)

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	560	54	44	0	0	0	0	0	0	0	0	0	2	0	100
	561	32	53	0	1	0	12	0	0	0	2	0	0	0	100
	562	11	84	0	0	0	0	0	0	0	3	2	0	0	100
	563	18	13	0	6	0	0	61	0	0	2	0	0	0	100
	564	68	19	0	0	0	4	0	0	0	7	2	0	0	100
	Mean	36.60	42.60	.00	1.40	.00	3.20	12.20	.00	.00	2.80	.80	.40	.00	100.00
	StDev	24.04	28.54	.00	2.61	.00	5.22	27.28	.00	.00	2.59	1.10	.89	.00	.00
Endocladia	555	27	0	0	35	0	37	0	0	0	1	0	0	0	100
	556	50	5	0	33	0	11	0	0	0	1	0	0	0	100
	557	34	1	0	25	0	25	0	4	0	10	1	0	0	100
	558	56	0	1	32	0	2	0	0	0	6	3	0	0	100
	559	65	0	0	7	0	0	0	0	0	27	1	0	0	100
	Mean	46.40	1.20	.20	26.40	.00	15.00	.00	.80	.00	9.00	1.00	.00	.00	100.00
	StDev	15.66	2.17	.45	11.48	.00	15.76	.00	1.79	.00	10.75	1.22	.00	.00	.00
Silvetia (Rockweed)	565	0	0	0	0	0	97	0	0	0	3	0	0	0	100
	566	23	0	0	0	0	73	0	0	0	2	0	2	0	100
	567	40	0	0	0	0	51	0	0	0	8	1	0	0	100
	568	10	0	0	6	0	84	0	0	0	0	0	0	0	100
	569	77	1	0	12	0	3	0	0	0	6	1	0	0	100
	Mean	30.00	.20	.00	3.60	.00	61.60	.00	.00	.00	3.80	.40	.40	.00	100.00
	StDev	30.24	.45	.00	5.37	.00	36.85	.00	.00	.00	3.19	.55	.89	.00	.00
Mussels	550	35	0	0	0	0	0	26	3	2	26	8	0	0	100
	551	15	0	0	0	0	0	63	1	0	18	3	0	0	100
	552	23	0	0	0	0	0	40	0	9	24	4	0	0	100
	553	36	0	1	0	0	0	26	0	8	26	3	0	0	100
	554	22	0	1	0	0	0	37	2	1	35	2	0	0	100
	Mean	26.20	.00	.40	.00	.00	.00	38.40	1.20	4.00	25.80	4.00	.00	.00	100.00
	StDev	9.04	.00	.55	.00	.00	.00	15.14	1.30	4.18	6.10	2.35	.00	.00	.00

Percent Cover of Index Species Cat Rock, Anacapa Island - Fall 2007 (12/21/07)

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	31	40	47	0	3	10	0	0	0	0	0	0	0	0	100
	32	39	55	0	6	0	0	0	0	0	0	0	0	0	100
	33	36	24	0	10	29	1	0	0	0	0	0	0	0	100
	35	44	53	0	1	2	0	0	0	0	0	0	0	0	100
	36	45	33	0	8	13	1	0	0	0	0	0	0	0	100
	37	35	38	0	11	11	0	0	0	0	4	1	0	0	100
	38	56	44	0	0	0	0	0	0	0	0	0	0	0	100
	39	24	76	0	0	0	0	0	0	0	0	0	0	0	100
	135	36	64	0	0	0	0	0	0	0	0	0	0	0	100
	Mean	39.44	48.22	.00	4.33	7.22	.22	.00	.00	.00	.44	.11	.00	.00	100.00
Endocladia	StDev	8.72	15.94	.00	4.50	9.78	.44	.00	.00	.00	1.33	.33	.00	.00	.00
	13	41	19	6	25	0	0	5	0	0	4	0	0	0	100
	14	39	7	19	6	0	0	17	0	0	7	5	0	0	100
	19	39	5	0	42	2	11	0	0	0	1	0	0	0	100
	51	20	3	5	6	0	0	1	16	0	49	0	0	0	100
	52	14	1	10	28	0	0	6	13	0	28	0	0	0	100
	54	18	0	8	27	0	0	7	14	0	26	0	0	0	100
	212	22	3	3	60	0	0	5	0	1	6	0	0	0	100
	467	42	1	5	23	0	0	19	0	0	8	2	0	0	100
	492	38	6	9	25	0	3	3	4	0	12	0	0	0	100
Silvetia (Rockweed)	Mean	30.33	5.00	7.22	26.89	.22	1.56	7.00	5.22	.11	15.67	.78	.00	.00	100.00
	StDev	11.48	5.77	5.38	16.66	.67	3.68	6.65	7.00	.33	15.66	1.72	.00	.00	.00
	2	36	21	0	11	25	6	0	0	0	1	0	0	0	100
	3	49	40	0	2	6	2	0	0	0	1	0	0	0	100
	4	38	24	0	6	4	25	0	0	0	2	1	0	0	100
	5	37	22	2	13	0	5	8	0	0	13	0	0	0	100
	6	19	4	0	5	17	55	0	0	0	0	0	0	0	100
	8	21	4	0	1	2	72	0	0	0	0	0	0	0	100
	9	6	0	0	3	5	86	0	0	0	0	0	0	0	100
	10	30	21	0	7	0	34	0	1	0	7	0	0	0	100
Silvetia (Rockweed)	55	33	18	2	13	16	0	11	0	0	7	0	0	0	100
	Mean	29.89	17.11	.44	6.78	8.33	31.67	2.11	.11	.00	3.44	.11	.00	.00	100.00
	StDev	12.73	12.56	.88	4.60	8.85	32.45	4.26	.33	.00	4.56	.33	.00	.00	.00

Percent Cover of Index Species
Cat Rock, Anacapa Island - Fall 2007 (12/21/07)(continued)

Zone	Plot	Bare Rock	Acor Barnacle	Tetra- clita	Endo- cladia	Hespero- phycus	Silvetia	Mussels	Turf- weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other	Total
Mussels	56	19	1	23	0	0	0	51	1	0	5	0	0	0	100
	164	13	1	17	1	0	0	49	0	0	19	0	0	0	100
	203	21	3	7	0	0	0	44	6	0	19	0	0	0	100
	204	10	1	9	0	0	0	76	0	0	4	0	0	0	100
	468	11	1	14	0	0	0	29	0	0	44	1	0	0	100
	470	50	1	9	4	0	0	27	0	0	9	0	0	0	100
	471	20	0	13	6	0	0	28	1	0	32	0	0	0	100
	472	7	2	11	0	0	0	74	0	0	6	0	0	0	100
	473	39	1	8	1	0	0	36	0	0	15	0	0	0	100
	Mean	21.11	1.22	12.33	1.33	.00	.00	46.00	.89	.00	17.00	.11	.00	.00	100.00
	StDev	14.37	.83	5.12	2.18	.00	.00	18.69	1.96	.00	13.53	.33	.00	.00	.00

Percent Cover of Index Species
Middle-East, Anacapa Island - Fall 2007 (12/20/07)

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	243	59	4	22	0	0	0	3	0	0	12	0	0	0	100
	244	68	1	2	15	0	0	3	0	0	6	5	0	0	100
	245	72	4	6	4	0	0	5	0	0	7	2	0	0	100
	Mean	66.33	3.00	10.00	6.33	.00	.00	3.67	.00	.00	8.33	2.33	.00	.00	100.00
	StDev	6.66	1.73	10.58	7.77	.00	.00	1.15	.00	.00	3.21	2.52	.00	.00	.00
Endocladia	240	63	5	0	18	0	1	0	0	0	13	0	0	0	100
	241	43	2	12	9	0	0	14	0	0	20	0	0	0	100
	242	41	7	8	17	0	0	1	0	0	25	1	0	0	100
	Mean	49.00	4.67	6.67	14.67	.00	.33	5.00	.00	.00	19.33	.33	.00	.00	100.00
	StDev	12.17	2.52	6.11	4.93	.00	.58	7.81	.00	.00	6.03	.58	.00	.00	.00
Silvetia (Rockweed)	53	59	4	22	0	0	0	3	0	0	12	0	0	0	100
	237	6	2	0	1	2	71	0	0	0	17	1	0	0	100
	469	5	0	1	0	0	44	1	0	0	49	0	0	0	100
	Mean	23.33	2.00	7.67	.33	.67	38.33	1.33	.00	.00	26.00	.33	.00	.00	100.00
	StDev	30.89	2.00	12.42	.58	1.15	35.84	1.53	.00	.00	20.07	.58	.00	.00	.00
Mussels	476	6	0	2	0	0	0	69	0	0	22	1	0	0	100
	477	6	2	4	0	0	0	45	0	0	43	0	0	0	100
	478	5	0	3	0	0	0	69	0	0	21	2	0	0	100
	Mean	5.67	.67	3.00	.00	.00	.00	61.00	.00	.00	28.67	1.00	.00	.00	100.00
	StDev	.58	1.15	1.00	.00	.00	.00	13.86	.00	.00	12.42	1.00	.00	.00	.00

Percent Cover of Index Species

Middle-West, Anacapa Island - Fall 2007 (12/20/07)

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	447	53	43	0	0	0	0	0	0	0	4	0	0	0	100
	448	49	6	0	14	0	0	9	1	0	20	1	0	0	100
	449	59	9	0	3	0	0	0	0	0	29	0	0	0	100
	450	60	10	0	7	0	0	0	0	0	23	0	0	0	100
	451	46	3	0	36	0	0	1	0	0	14	0	0	0	100
	Mean	53.40	14.20	.00	12.00	.00	.00	2.00	.20	.00	18.00	.20	.00	.00	100.00
	StDev	6.11	16.33	.00	14.40	.00	.00	3.94	.45	.00	9.51	.45	.00	.00	.00
Endocladia	457	12	0	0	29	0	0	35	2	0	22	0	0	0	100
	458	41	0	2	20	0	0	21	0	0	15	1	0	0	100
	459	44	3	0	6	0	0	15	0	0	32	0	0	0	100
	460	64	10	0	14	0	0	0	0	0	12	0	0	0	100
	461	77	2	0	14	0	0	0	0	0	7	0	0	0	100
	Mean	47.60	3.00	.40	16.60	.00	.00	14.20	.40	.00	17.60	.20	.00	.00	100.00
	StDev	24.79	4.12	.89	8.53	.00	.00	14.86	.89	.00	9.71	.45	.00	.00	.00
Silvetia (Rockweed)	452	41	4	2	3	0	49	1	0	0	0	0	0	0	100
	453	35	0	0	0	0	56	3	0	0	6	0	0	0	100
	454	5	0	0	16	0	0	1	13	0	64	1	0	0	100
	455	24	0	0	10	0	20	20	5	0	20	1	0	0	100
	456	62	0	2	2	0	3	15	0	0	15	1	0	0	100
	Mean	33.40	.80	.80	6.20	.00	25.60	8.00	3.60	.00	21.00	.60	.00	.00	100.00
	StDev	21.05	1.79	1.10	6.65	.00	25.83	8.89	5.68	.00	25.26	.55	.00	.00	.00
Mussels	462	20	0	3	0	0	0	52	0	1	21	3	0	0	100
	463	21	0	8	0	0	0	40	3	0	25	3	0	0	100
	464	18	0	2	0	0	0	70	0	0	10	0	0	0	100
	465	13	0	0	0	0	0	75	0	0	11	1	0	0	100
	466	4	0	0	0	0	0	95	0	0	0	1	0	0	100
	Mean	15.20	.00	2.60	.00	.00	.00	66.40	.60	.20	13.40	1.60	.00	.00	100.00
	StDev	6.98	.00	3.29	.00	.00	.00	21.27	1.34	.45	9.86	1.34	.00	.00	.00

Percent Cover of Index Species
S. Frenchy's Cove, Anacapa Island - Fall 2007 (12/21/07)

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	249	38	62	0	0	0	0	0	0	0	0	0	0	0	100
	250	29	58	0	0	0	0	0	0	0	13	0	0	0	100
	251	13	79	0	7	0	0	0	0	0	0	1	0	0	100
	252	45	48	0	7	0	0	0	0	0	0	0	0	0	100
	253	24	51	0	6	11	0	0	0	0	8	0	0	0	100
	Mean	29.80	59.60	.00	4.00	2.20	.00	.00	.00	.00	4.20	.20	.00	.00	100.00
	StDev	12.40	12.18	.00	3.67	4.92	.00	.00	.00	.00	6.02	.45	.00	.00	.00
Endocladia	154	19	7	0	66	0	3	0	0	0	5	0	0	0	100
	155	16	0	0	60	0	20	0	0	0	4	0	0	0	100
	256	22	0	0	59	6	13	0	0	0	0	0	0	0	100
	257	11	0	0	89	0	0	0	0	0	0	0	0	0	100
	258	11	0	0	51	0	38	0	0	0	0	0	0	0	100
	Mean	15.80	1.40	.00	65.00	1.20	14.80	.00	.00	.00	1.80	.00	.00	.00	100.00
	StDev	4.87	3.13	.00	14.44	2.68	15.22	.00	.00	.00	2.49	.00	.00	.00	.00
Silvetia (Rockweed)	259	8	5	0	0	0	46	0	0	0	41	0	0	0	100
	260	4	8	0	7	0	71	0	0	0	10	0	0	0	100
	261	8	4	0	0	0	44	0	0	0	44	0	0	0	100
	262	45	8	0	23	0	18	0	0	0	6	0	0	0	100
	263	16	2	0	1	0	75	0	0	0	6	0	0	0	100
	Mean	16.20	5.40	.00	6.20	.00	50.80	.00	.00	.00	21.40	.00	.00	.00	100.00
	StDev	16.68	2.61	.00	9.83	.00	23.12	.00	.00	.00	19.36	.00	.00	.00	.00
Mussels	201	8	0	0	0	0	0	41	17	0	34	0	0	0	100
	202	3	0	1	0	0	0	75	12	0	9	0	0	0	100
	264	3	0	0	0	0	0	76	5	0	16	0	0	0	100
	265	7	0	0	0	0	0	78	4	0	10	1	0	0	100
	266	10	0	0	0	0	0	66	5	0	19	0	0	0	100
	Mean	6.20	.00	.20	.00	.00	.00	67.20	8.60	.00	17.60	.20	.00	.00	100.00
	StDev	3.11	.00	.45	.00	.00	.00	15.35	5.68	.00	10.06	.45	.00	.00	.00

Percent Cover of Index Species

Crook Point, San Miguel Island - Fall 2007 (1/20/08)

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	65	35	0	0	0	0	0	0	0	0	0	0	0	100
	147	63	37	0	0	0	0	0	0	0	0	0	0	0	100
	148	43	51	0	6	0	0	0	0	0	0	0	0	0	100
	149	68	11	0	17	0	0	4	0	0	0	0	0	0	100
	495	41	59	0	0	0	0	0	0	0	0	0	0	0	100
	Mean	56.00	38.60	.00	4.60	.00	.00	.80	.00	.00	.00	.00	.00	.00	100.00
	StDev	12.92	18.35	.00	7.40	.00	.00	1.79	.00	.00	.00	.00	.00	.00	.00
Endocladia	386	80	7	0	8	1	0	3	0	0	0	1	0	0	100
	387	34	0	1	34	0	0	0	0	0	31	0	0	0	100
	388	58	10	0	1	0	0	0	0	0	30	1	0	0	100
	389	21	1	1	33	5	0	34	0	2	1	1	0	0	99
	390	47	14	0	10	0	0	13	3	0	12	1	0	0	100
	Mean	48.00	6.40	.40	17.20	1.20	.00	10.00	.60	.40	14.80	.80	.00	.00	99.80
	StDev	22.64	5.94	.55	15.25	2.17	.00	14.44	1.34	.89	15.09	.45	.00	.00	.45
Silvetia (Rockweed)	396	43	3	0	19	6	0	21	0	4	3	1	0	0	100
	397	4	0	0	0	0	0	95	0	0	1	0	0	0	100
	398	63	4	0	5	0	0	22	0	3	3	0	0	0	100
	399	31	0	0	0	0	0	0	2	0	67	0	0	0	100
	400	40	0	0	44	13	0	2	0	0	1	0	0	0	100
	Mean	36.20	1.40	.00	13.60	3.80	.00	28.00	.40	1.40	15.00	.20	.00	.00	100.00
	StDev	21.46	1.95	.00	18.69	5.76	.00	38.84	.89	1.95	29.09	.45	.00	.00	.00
Mussels	381	31	3	2	0	0	0	0	59	0	5	0	0	0	100
	382	4	0	0	0	0	0	91	0	0	5	0	0	0	100
	383	13	0	0	0	0	0	80	0	0	7	0	0	0	100
	384	16	0	1	0	0	0	80	0	0	3	0	0	0	100
	385	23	0	1	0	0	0	62	0	5	9	0	0	0	100
	Mean	17.40	.60	.80	.00	.00	.00	62.60	11.80	1.00	5.80	.00	.00	.00	100.00
	StDev	10.21	1.34	.84	.00	.00	.00	36.51	26.39	2.24	2.28	.00	.00	.00	.00

Percent Cover of Index Species

Cuyler Harbor, San Miguel Island - Fall 2007 (4/10/08)

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	78	0	0	0	0	0	0	0	0	0	0	0	100
	417	32	40	0	28	0	0	0	0	0	0	0	0	0	100
	418	19	72	0	7	0	0	2	0	0	0	0	0	0	100
	419	27	18	0	49	0	5	0	0	0	1	0	0	0	100
	420	20	10	0	70	0	0	0	0	0	0	0	0	0	100
	Mean	24.00	43.60	.00	30.80	.00	1.00	.40	.00	.00	.20	.00	.00	.00	100.00
	StDev	5.43	30.77	.00	29.12	.00	2.24	.89	.00	.00	.45	.00	.00	.00	.00
Endocladia	411	60	0	0	17	0	0	15	0	0	5	3	0	0	100
	412	23	30	0	12	0	0	33	0	0	2	0	0	0	100
	413	22	0	0	19	0	51	0	0	0	8	0	0	0	100
	414	47	0	0	24	0	0	2	1	0	21	5	0	0	100
	415	28	0	0	43	0	4	0	0	0	25	0	0	0	100
	Mean	36.00	6.00	.00	23.00	.00	11.00	10.00	.20	.00	12.20	1.60	.00	.00	100.00
	StDev	16.78	13.42	.00	11.98	.00	22.43	14.30	.45	.00	10.18	2.30	.00	.00	.00
Silvetia (Rockweed)	406	12	0	0	6	0	58	1	1	0	17	5	0	0	100
	407	20	0	0	0	0	68	0	0	0	9	3	0	0	100
	408	11	0	7	0	0	74	0	0	0	8	0	0	0	100
	409	10	0	0	1	0	73	0	2	0	11	3	0	0	100
	410	29	0	4	0	0	56	0	1	0	4	6	0	0	100
	Mean	16.40	.00	2.20	1.40	.00	65.80	.20	.80	.00	9.80	3.40	.00	.00	100.00
	StDev	8.08	.00	3.19	2.61	.00	8.38	.45	.84	.00	4.76	2.30	.00	.00	.00
Mussels	401	30	14	16	0	0	0	8	1	4	12	15	0	0	100
	402	3	0	0	0	0	0	75	2	0	3	17	0	0	100
	403	8	0	1	0	0	0	85	1	2	1	2	0	0	100
	404	37	0	7	0	0	0	27	5	1	8	15	0	0	100
	405	28	1	7	0	0	0	46	3	5	2	8	0	0	100
	Mean	21.20	3.00	6.20	.00	.00	.00	48.20	2.40	2.40	5.20	11.40	.00	.00	100.00
	StDev	14.82	6.16	6.38	.00	.00	.00	32.18	1.67	2.07	4.66	6.27	.00	.00	.00

Percent Cover of Index Species

Harris Point, San Miguel Island - Fall 2007 (1/21/08)

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	23	71	0	3	0	0	0	0	0	3	0	0	0	100
	441	29	68	0	3	0	0	0	0	0	0	0	0	0	100
	442	58	38	0	3	0	0	0	0	0	1	0	0	0	100
	443	35	56	0	0	0	0	0	0	0	0	0	9	0	100
	444	42	53	0	5	0	0	0	0	0	0	0	0	0	100
	Mean	37.40	57.20	.00	2.80	.00	.00	.00	.00	.00	.80	.00	1.80	.00	100.00
	StDev	13.50	13.18	.00	1.79	.00	.00	.00	.00	.00	1.30	.00	4.02	.00	.00
Endocladia	431	35	2	1	19	0	0	7	0	0	36	0	0	0	100
	432	16	15	1	39	5	0	0	0	0	24	0	0	0	100
	433	22	14	0	38	6	0	1	0	0	19	0	0	0	100
	434	36	0	0	31	28	0	0	0	0	4	1	0	0	100
	435	18	0	0	27	32	0	0	0	0	23	0	0	0	100
	Mean	25.40	6.20	.40	30.80	14.20	.00	1.60	.00	.00	21.20	.20	.00	.00	100.00
	StDev	9.48	7.63	.55	8.26	14.67	.00	3.05	.00	.00	11.52	.45	.00	.00	.00
Mussels	426	32	1	0	1	0	0	38	0	4	24	0	0	0	100
	427	63	0	1	3	1	0	0	0	0	31	1	0	0	100
	428	80	0	0	2	1	0	0	0	0	14	3	0	0	100
	429	27	2	1	0	0	0	37	0	0	33	0	0	0	100
	430	9	2	1	0	0	0	46	0	0	42	0	0	0	100
	Mean	42.20	1.00	.60	1.20	.40	.00	24.20	.00	.80	28.80	.80	.00	.00	100.00
	StDev	28.72	1.00	.55	1.30	.55	.00	22.37	.00	1.79	10.47	1.30	.00	.00	.00
Tetraclita	436	41	4	5	0	0	0	33	0	0	15	2	0	0	100
	437	30	0	17	0	0	0	19	0	0	30	4	0	0	100
	438	8	0	0	0	0	0	0	30	0	62	0	0	0	100
	439	24	0	1	3	0	0	0	8	0	62	2	0	0	100
	445	27	0	7	3	0	0	18	8	0	35	2	0	0	100
	Mean	26.00	.80	6.00	1.20	.00	.00	14.00	9.20	.00	40.80	2.00	.00	.00	100.00
	StDev	11.94	1.79	6.78	1.64	.00	.00	14.09	12.30	.00	20.71	1.41	.00	.00	.00
Hesperophycus	421	23	1	0	30	37	0	0	0	0	9	0	0	0	100
	422	23	0	0	15	44	0	0	0	0	18	0	0	0	100
	423	49	0	0	12	8	0	0	0	0	31	0	0	0	100
	424	15	0	0	11	66	0	0	0	0	8	0	0	0	100
	425	42	0	0	6	37	0	0	0	0	15	0	0	0	100
	Mean	30.40	.20	.00	14.80	38.40	.00	.00	.00	.00	16.20	.00	.00	.00	100.00
	StDev	14.38	.45	.00	9.09	20.74	.00	.00	.00	.00	9.26	.00	.00	.00	.00

Percent Cover of Index Species

Otter Harbor, San Miguel Island - Fall 2007 (1/19/08)

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	83	17	0	0	0	0	0	0	0	0	0	0	0	100.00
	371	21	79	0	0	0	0	0	0	0	0	0	0	0	100.00
	372	67	33	0	0	0	0	0	0	0	0	0	0	0	100.00
	373	33	32	0	0	0	0	0	0	0	35	0	0	0	100.00
	374	1	0	0	0	0	0	0	35	0	64	0	0	0	100.00
	Mean	41.00	32.20	0.00	0.00	0.00	0.00	0.00	7.00	0.00	19.80	0.00	0.00	0.00	100.00
	StDev	33.56	29.41	0.00	0.00	0.00	0.00	0.00	15.65	0.00	28.99	0.00	0.00	0.00	0.00
Endocladia	360	50	3	2	20	0	8	2	0	0	15	0	0	0	100.00
	361	57	1	0	33	0	1	0	0	0	8	0	0	0	100.00
	362	4	0	0	57	0	0	0	0	1	38	0	0	0	100.00
	363	15	0	0	33	0	5	0	0	0	47	0	0	0	100.00
	364	19	0	0	37	0	17	0	0	0	27	0	0	0	100.00
	Mean	29.00	0.80	0.40	36.00	0.00	6.20	0.40	0.00	0.20	27.00	0.00	0.00	0.00	100.00
	StDev	23.16	1.30	0.89	13.38	0.00	6.83	0.89	0.00	0.45	16.02	0.00	0.00	0.00	0.00
Silvetia (Rockweed)	355	56	14	0	0	0	0	0	0	0	28	1	1	0	100.00
	356	7	0	0	28	0	42	0	0	1	22	0	0	0	100.00
	357	13	0	0	32	0	11	0	0	0	44	0	0	0	100.00
	358	22	47	0	27	0	0	0	0	0	4	0	0	0	100.00
	359	27	52	0	5	0	0	0	0	0	16	0	0	0	100.00
	Mean	25.00	22.60	0.00	18.40	0.00	10.60	0.00	0.00	0.20	22.80	0.20	0.20	0.00	100.00
	StDev	18.99	25.27	0.00	14.74	0.00	18.19	0.00	0.00	0.45	14.81	0.45	0.45	0.00	0.00
Mussels	375	9	0	0	0	0	0	45	0	6	36	4	0	0	100.00
	376	11	0	1	1	0	0	33	0	2	51	1	0	0	100.00
	378	5	2	1	1	0	0	48	0	12	31	0	0	0	100.00
	379	14	1	0	0	0	0	29	0	1	53	2	0	0	100.00
	380	3	2	0	2	0	0	32	0	5	54	2	0	0	100.00
	Mean	8.40	1.00	0.40	0.80	0.00	0.00	37.40	0.00	5.20	45.00	1.80	0.00	0.00	100.00
	StDev	4.45	1.00	0.55	0.84	0.00	0.00	8.50	0.00	4.32	10.70	1.48	0.00	0.00	0.00

Percent Cover of Index Species

Landing Cove, Santa Barbara Island - Fall 2007 (10/25/07)

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	315	73	17	5	3	0	0	0	0	0	2	0	0	0	100
	316	65	5	5	5	0	0	2	2	0	16	0	0	0	100
	317	57	2	7	4	0	0	9	2	0	17	2	0	0	100
	318	19	2	19	0	0	0	49	0	1	8	2	0	0	100
	319	56	5	11	1	0	0	3	12	0	10	2	0	0	100
	Mean	54.00	6.20	9.40	2.60	.00	.00	12.60	3.20	.20	10.60	1.20	.00	.00	100.00
	StDev	20.74	6.22	5.90	2.07	.00	.00	20.62	5.02	.45	6.15	1.10	.00	.00	.00
Silvetia (Rockweed)	310	24	1	2	0	0	3	4	11	0	55	0	0	0	100
	311	31	2	0	0	0	2	0	9	0	56	0	0	0	100
	312	22	1	0	0	0	0	0	13	0	64	0	0	0	100
	313	33	0	0	0	0	0	0	27	0	40	0	0	0	100
	314	24	0	0	0	0	10	1	20	0	45	0	0	0	100
	Mean	26.80	.80	.40	.00	.00	3.00	1.00	16.00	.00	52.00	.00	.00	.00	100.00
	StDev	4.87	.84	.89	.00	.00	4.12	1.73	7.42	.00	9.51	.00	.00	.00	.00
Mussels	325	0	0	0	0	0	0	100	0	0	0	0	0	0	100
	326	7	0	0	0	0	0	48	0	0	43	2	0	0	100
	327	31	0	0	0	0	0	51	0	0	18	0	0	0	100
	328	10	0	0	0	0	0	86	0	0	4	0	0	0	100
	329	26	0	4	0	0	0	45	0	2	8	15	0	0	100
	Mean	14.80	.00	.80	.00	.00	.00	66.00	.00	.40	14.60	3.40	.00	.00	100.00
	StDev	13.14	.00	1.79	.00	.00	.00	25.23	.00	.89	17.23	6.54	.00	.00	.00
Red Algal Turf	320	0	0	0	0	0	0	0	100	0	0	0	0	0	100
	321	0	0	0	0	0	0	17	66	0	17	0	0	0	100
	322	0	0	0	0	0	0	10	4	0	28	2	0	56	100
	323	0	0	0	0	0	0	0	0	0	0	0	0	100	100
	324	0	0	0	0	0	0	0	30	0	69	1	0	0	100
	Mean	.00	.00	.00	.00	.00	.00	5.40	40.00	.00	22.80	.60	.00	31.20	100.00
	StDev	.00	.00	.00	.00	.00	.00	7.80	42.64	.00	28.44	.89	.00	45.47	.00

Percent Cover of Index Species

Sea Lion Rookery, Santa Barbara Island - Fall 2007 (10/31/07)

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	345	50	3	1	0	0	0	3	0	0	43	0	0	0	100
	346	91	3	0	0	0	0	0	0	0	6	0	0	0	100
	347	84	10	0	0	0	0	0	0	0	6	0	0	0	100
	348	32	3	1	0	0	0	0	0	0	64	0	0	0	100
	349	62	3	2	0	0	0	0	0	0	33	0	0	0	100
	Mean	63.80	4.40	.80	.00	.00	.00	.60	.00	.00	30.40	.00	.00	.00	100.00
	StDev	24.25	3.13	.84	.00	.00	.00	1.34	.00	.00	24.93	.00	.00	.00	.00
	Endocladia	335	31	2	16	2	0	2	0	1	46	0	0	0	100
		336	32	0	1	0	0	0	0	1	66	0	0	0	100
		337	20	4	0	4	0	11	0	1	59	1	0	0	100
		338	30	1	3	1	0	6	0	0	59	0	0	0	100
		339	18	0	12	2	0	0	0	0	68	0	0	0	100
		Mean	26.20	1.40	6.40	1.80	.00	3.80	.00	.60	59.60	.20	.00	.00	100.00
		StDev	6.65	1.67	7.16	1.48	.00	4.71	.00	.55	8.62	.45	.00	.00	.00
Silvetia (Rockweed)	330	34	0	16	0	0	0	22	3	0	23	2	0	0	100
	331	32	0	0	2	0	33	1	2	0	30	0	0	0	100
	332	17	0	1	0	0	17	3	4	0	58	0	0	0	100
	333	10	0	1	0	0	23	2	27	0	37	0	0	0	100
	334	13	0	0	1	0	29	0	0	0	57	0	0	0	100
	Mean	21.20	.00	3.60	.60	.00	20.40	5.60	7.20	.00	41.00	.40	.00	.00	100.00
	StDev	11.08	.00	6.95	.89	.00	12.92	9.24	11.17	.00	15.86	.89	.00	.00	.00
	Mussels	350	0	0	0	0	0	99	0	0	1	0	0	0	100
		351	2	0	0	0	0	93	0	0	4	1	0	0	100
		352	0	0	0	0	0	100	0	0	0	0	0	0	100
		353	0	0	0	0	0	94	0	0	3	3	0	0	100
		354	1	0	2	0	0	84	0	2	8	3	0	0	100
		Mean	.60	.00	.40	.00	.00	94.00	.00	.40	3.20	1.40	.00	.00	100.00
		StDev	.89	.00	.89	.00	.00	6.36	.00	.89	3.11	1.52	.00	.00	.00

Percent Cover of Index Species

Orizaba Cove, Santa Cruz Island - Fall 2007 (12/22/07)

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	851	30	50	7	0	0	0	3	0	0	10	0	0	0	100
	852	25	69	0	1	0	0	1	0	0	4	0	0	0	100
	853	30	67	0	0	0	0	3	0	0	0	0	0	0	100
	854	30	47	7	0	0	0	8	0	0	8	0	0	0	100
	855	18	73	0	0	0	0	2	0	0	7	0	0	0	100
	Mean	26.60	61.20	2.80	.20	.00	.00	3.40	.00	.00	5.80	.00	.00	.00	100.00
	StDev	5.27	11.84	3.83	.45	.00	.00	2.70	.00	.00	3.90	.00	.00	.00	.00
Silvetia (Rockweed)	866	16	0	16	0	4	8	45	0	0	11	0	0	0	100
	867	7	0	1	1	23	44	1	0	0	23	0	0	0	100
	868	10	0	3	2	5	36	23	0	0	21	0	0	0	100
	869	16	0	1	5	3	62	0	0	0	13	0	0	0	100
	870	18	0	5	9	15	33	0	0	0	20	0	0	0	100
	Mean	13.40	.00	5.20	3.40	10.00	36.60	13.80	.00	.00	17.60	.00	.00	.00	100.00
	StDev	4.67	.00	6.26	3.65	8.72	19.57	20.02	.00	.00	5.27	.00	.00	.00	.00
Mussels	861	4	1	0	0	0	0	91	0	0	4	0	0	0	100
	862	1	0	1	0	0	0	66	0	0	12	20	0	0	100
	863	25	0	0	0	0	0	28	0	0	25	22	0	0	100
	864	26	0	0	0	0	0	0	0	0	62	12	0	0	100
	865	26	1	0	0	0	0	0	0	0	73	0	0	0	100
	Mean	16.40	.40	.20	.00	.00	.00	37.00	.00	.00	35.20	10.80	.00	.00	100.00
	StDev	12.74	.55	.45	.00	.00	.00	40.55	.00	.00	30.67	10.55	.00	.00	.00
Tetraclita	871	1	0	5	0	0	0	94	0	0	0	0	0	0	100
	872	2	0	2	0	0	0	92	0	0	4	0	0	0	100
	873	12	0	26	0	0	1	48	0	0	12	1	0	0	100
	874	12	0	16	0	0	0	63	0	1	7	1	0	0	100
	875	15	2	15	0	0	0	61	0	0	7	0	0	0	100
	Mean	8.40	.40	12.80	.00	.00	.20	71.60	.00	.20	6.00	.40	.00	.00	100.00
	StDev	6.43	.89	9.58	.00	.00	.45	20.38	.00	.45	4.42	.55	.00	.00	.00
Hesperophycus	856	12	21	1	29	4	1	7	0	0	25	0	0	0	100
	857	18	6	2	13	22	13	16	0	0	10	0	0	0	100
	858	12	1	0	6	54	10	3	0	0	14	0	0	0	100
	859	6	39	0	17	0	0	37	0	0	1	0	0	0	100
	860	13	1	0	16	64	0	0	0	0	6	0	0	0	100
	Mean	12.20	13.60	.60	16.20	28.80	4.80	12.60	.00	.00	11.20	.00	.00	.00	100.00
	StDev	4.27	16.40	.89	8.35	29.00	6.22	14.91	.00	.00	9.09	.00	.00	.00	.00

Percent Cover of Index Species East Point, Santa Rosa Island - Fall 2007 (1/3/08)

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	44	46	0	0	0	0	0	0	0	10	0	0	0	100
	576	40	35	0	12	10	0	1	0	0	1	1	0	0	100
	577	38	7	0	24	25	4	0	0	0	1	0	0	1	100
	578	52	47	0	0	0	0	0	0	0	0	0	1	0	100
	579	23	77	0	0	0	0	0	0	0	0	0	0	0	100
	Mean	39.40	42.40	.00	7.20	7.00	.80	.20	.00	.00	2.40	.20	.20	.20	100.00
	StDev	10.62	25.20	.00	10.73	10.95	1.79	.45	.00	.00	4.28	.45	.45	.45	.00
Endocladia	580	23	0	0	71	5	0	0	0	0	1	0	0	0	100
	581	40	0	0	57	3	0	0	0	0	0	0	0	0	100
	582	21	0	0	74	5	0	0	0	0	0	0	0	0	100
	583	57	0	0	43	0	0	0	0	0	0	0	0	0	100
	584	34	1	0	49	16	0	0	0	0	0	0	0	0	100
	Mean	35.00	.20	.00	58.80	5.80	.00	.00	.00	.00	.20	.00	.00	.00	100.00
	StDev	14.58	.45	.00	13.50	6.06	.00	.00	.00	.00	.45	.00	.00	.00	.00
Silvetia (Rockweed)	585	57	0	0	17	3	9	0	0	0	14	0	0	0	100
	586	55	0	0	13	0	25	0	0	0	7	0	0	0	100
	587	63	2	0	4	1	20	0	3	0	7	0	0	0	100
	588	2	0	0	1	0	80	0	0	0	17	0	0	0	100
	589	28	0	0	0	0	53	0	1	0	18	0	0	0	100
	Mean	41.00	.40	.00	7.00	.80	37.40	.00	.80	.00	12.60	.00	.00	.00	100.00
	StDev	25.62	.89	.00	7.58	1.30	28.81	.00	1.30	.00	5.32	.00	.00	.00	.00
Mussels	590	5	0	0	1	0	0	37	11	0	44	2	0	0	100
	591	7	2	0	0	0	0	30	17	0	43	1	0	0	100
	592	2	0	0	0	0	0	71	2	0	25	0	0	0	100
	593	1	0	0	0	0	0	80	0	0	19	0	0	0	100
	594	2	0	0	1	0	0	86	0	0	11	0	0	0	100
	Mean	3.40	.40	.00	.40	.00	.00	60.80	6.00	.00	28.40	.60	.00	.00	100.00
	StDev	2.51	.89	.00	.55	.00	.00	25.61	7.65	.00	14.66	.89	.00	.00	.00
Hesperophycus	570	29	0	0	63	8	0	0	0	0	0	0	0	0	100
	571	35	3	0	38	24	0	0	0	0	0	0	0	0	100
	572	29	2	0	38	31	0	0	0	0	0	0	0	0	100
	573	37	9	0	41	12	1	0	0	0	0	0	0	0	100
	574	34	3	0	45	10	4	0	0	0	4	0	0	0	100
	Mean	32.80	3.40	.00	45.00	17.00	1.00	.00	.00	.00	.80	.00	.00	.00	100.00
	StDev	3.63	3.36	.00	10.46	10.00	1.73	.00	.00	.00	1.79	.00	.00	.00	.00

Percent Cover of Index Species

Ford Point, Santa Rosa Island - Fall 2007 (1/3/08)

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	81	14	1	0	0	0	0	0	0	1	3	0	0	100
	521	80	16	0	0	0	0	0	0	0	3	1	0	0	100
	522	81	17	0	0	0	0	0	0	0	0	2	0	0	100
	523	48	3	0	46	0	0	0	0	0	1	2	0	0	100
	524	46	53	0	1	0	0	0	0	0	0	0	0	0	100
	Mean	67.20	20.60	.20	9.40	.00	.00	.00	.00	.00	1.00	1.60	.00	.00	100.00
	StDev	18.46	18.96	.45	20.46	.00	.00	.00	.00	.00	1.22	1.14	.00	.00	.00
Endocladia	525	26	0	0	57	0	0	6	0	0	11	0	0	0	100
	526	57	0	0	22	0	0	7	0	0	12	2	0	0	100
	527	53	0	0	25	0	0	2	0	0	18	2	0	0	100
	528	21	0	0	49	0	0	0	0	0	30	0	0	0	100
	529	47	0	0	37	0	0	0	0	0	15	1	0	0	100
	Mean	40.80	.00	.00	38.00	.00	.00	3.00	.00	.00	17.20	1.00	.00	.00	100.00
	StDev	16.28	.00	.00	15.07	.00	.00	3.32	.00	.00	7.66	1.00	.00	.00	.00
Mussels	530	75	0	0	1	0	0	22	0	0	1	1	0	0	100
	531	13	0	0	0	0	0	69	0	0	17	1	0	0	100
	532	14	0	1	0	0	0	13	3	0	62	6	0	1	100
	533	28	0	0	1	0	0	60	0	0	10	1	0	0	100
	534	23	0	0	0	0	0	0	53	0	20	4	0	0	100
	Mean	30.60	.00	.20	.40	.00	.00	32.80	11.20	.00	22.00	2.60	.00	.20	100.00
	StDev	25.60	.00	.45	.55	.00	.00	30.14	23.40	.00	23.53	2.30	.00	.45	.00

Percent Cover of Index Species

Johnson's Lee, Santa Rosa Island - Fall 2007 (1/3/08)

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	38	62	0	0	0	0	0	0	0	0	0	0	0	100
	501	58	42	0	0	0	0	0	0	0	0	0	0	0	100
	502	81	19	0	0	0	0	0	0	0	0	0	0	0	100
	503	55	43	0	2	0	0	0	0	0	0	0	0	0	100
	504	75	11	0	0	0	0	1	0	0	8	5	0	0	100
	Mean	61.40	35.40	.00	.40	.00	.00	.20	.00	.00	1.60	1.00	.00	.00	100.00
	StDev	17.10	20.45	.00	.89	.00	.00	.45	.00	.00	3.58	2.24	.00	.00	.00
Endocladia	505	50	0	0	29	0	0	16	0	0	5	0	0	0	100
	506	71	0	0	29	0	0	0	0	0	0	0	0	0	100
	507	65	0	0	11	0	0	15	0	0	9	0	0	0	100
	508	36	1	1	31	0	0	26	0	1	3	1	0	0	100
	509	52	3	0	38	0	0	0	0	0	7	0	0	0	100
	Mean	54.80	.80	.20	27.60	.00	.00	11.40	.00	.20	4.80	.20	.00	.00	100.00
	StDev	13.70	1.30	.45	9.99	.00	.00	11.26	.00	.45	3.49	.45	.00	.00	.00
Mussels	510	19	0	0	0	0	0	0	20	0	7	54	0	0	100
	511	14	0	0	0	0	0	0	19	0	4	63	0	0	100
	512	24	0	1	0	0	0	70	0	2	3	0	0	0	100
	513	39	0	0	0	0	0	0	22	0	37	2	0	0	100
	514	5	0	0	0	0	0	0	26	0	63	6	0	0	100
	515	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	516	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	517	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	518	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mean	11.22	.00	.11	.00	.00	.00	7.78	9.67	.22	12.67	13.89	.00	.00	55.56
	StDev	13.90	.00	.33	.00	.00	.00	23.33	11.62	.67	22.27	25.47	.00	.00	52.70

Appendix C. Trip Reports

The following are trip reports from the Rocky Intertidal Monitoring 2007 field season (March 2007 through January 2008). Reports were prepared by Dan Richards. 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.

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Spring 2008 Rocky Intertidal Monitoring Trip Reports

Santa Cruz Island January 30- February 2, 2007

(Database event #2007-A)

PURPOSE: Relocate tagged black abalone, *Haliotis cracherodii*, at Willows Anchorage to observe tag survival and examine abalone movement. Find and tag additional abalone. PISCO personnel were changing larval settlement plates (for barnacles) and Tuffies (for mussels) and installing pressure loggers at three sites for tidal height calculations.

PROCEDURE: Black abalone were tagged with Biomark PIT tags and shell length was recorded. Tags were read with a Biomark Pocket Reader. PIT tags were buried in a small amount of Z-Spar marine epoxy and attached to the outside of the shell. Seastar counts were done at each site by searching throughout the low intertidal zone for 30-minutes. Measurements of seastars were made of the longest arm (star radius) to the nearest 10 mm.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, Biological Technician, Channel Islands National Park
Carol Blanchette, UCSB/PISCO
Allison Smith, Graduate student, Univ. South Carolina/PISCO

January 30, 2007: Prisoners Harbor, Valley Anchorage. Low tide was -1.1ft at 1441 hrs. Sky was overcast, raining, calm, no surf. Susie Tharratt and I went out on Island Packers to Santa Cruz to monitor the black abalone I tagged at Willows Anchorage in December 2006. Carol Blanchette and Allison Smith also came out to change settlement plates, pads and install pressure sensors to measure water depth at the mussel beds. It started raining about 1230 and continued light rain through about 1600. The island got about 3 inches of rain over the weekend. More rain tonight. Today was very calm with no wind and no swell. We had some thunder and lightning in the early afternoon.

We got to Prisoners Harbor about 1400 hrs. We worked there until 1510 hrs. Allison installed the pressure logger and Carol replaced tuffies and plates. Susie and I measured seastars finding 55 *Pisaster ochraceus*, 51 measured plus 2 *P. giganteus*. There were numerous small stars.

There were a couple of large openings in the mussel bed where nothing was left but smooth bare rock and a thin film of filamentous algae. One was just below M1 and the other included part of M4 which is missing the upper left bolt now. Large *Nucella emarginata* were common and *Nucella* were abundant overall. On the inner reef below the *Hesperophycus* plots, *Acanthina* sp. were abundant forming clusters of 10 or more snails. Under a couple of the recruitment plates, tiny *Petrolisthes* sp. crabs were numerous and under one there were a dozen or so small (1 cm) *Haminoea* sp. *Sargassum muticum* was abundant. There was some *Endarachne binghamiae* and some *Porphyra* sp. present. The *Scytosiphon dotyi* was very lush and dense above the barnacle and rockweed plots. It was denser than it was in December. *Tetraclita rubescens* were abundant particularly near M5. The one remaining bolt in B1 was missing and only filamentous algae were present there.

We went to Valley Anchorage to replace plates and tuffies from 1640-1730. There, Susie and I counted seastars (separate counts for 30 minutes) and abalone finding 127 *Pisaster ochraceus*, seven black abalone, and one octopus. The abalone were not measured but were estimated to be between 25 and 110 mm, with five in one small hole, including the largest and smallest. There were numerous *P. ochraceus* under 50 mm radius.

January 31, 2007: Willows Anchorage. Low tide -1.1 ft. at 1516 hrs. Water temperature 14°C. The sky was partly cloudy and the winds were strong out of the northwest. The site was protected from the wind and there was no swell, the temperature was pleasant, so the working conditions were excellent. Because of the soggy roads after yesterday's rain, we walked to Willows from the research station, about 3 hours each way.

We got to the site about 1330 and stayed until 1630 hrs. Carol collected plates and tuffies and Allison installed a pressure logger in the mussels below the Endocladia plots. Carol also did a 30-minute count of *Pisaster*, finding 169. Susie and I searched for black abalone, first locating tagged abalone and reading their PIT tags with the reader. We recaptured 14 abalone tagged on 12/21/06. We found 38 black abalone without tags. There had been considerable movement as several of the clusters of abalone tagged in December had dispersed and new animals had appeared in open areas throughout the area. Once again, most abalone were found between reference bolts 1 and 2. Several were found west of reference bolt 3 and the only real suspect for tag loss was seen there. Tag loss is a possibility as the epoxy may not have had good adhesion to the shell and subsequently slipped off when pounded by waves. In most cases we might expect a little of the Z-Spar epoxy to remain but only one shell gave any hint of remaining epoxy and it was where I had tagged an abalone in December. Shells were rubbed clean before attaching the epoxy when they felt slimy with diatoms.

There were quite a few abalone in the 70 mm range that were out in the open which was perfect for applying tags. I applied PIT tags to 22 new abalone, with sizes ranging from 42-108 mm. One of the new tags failed to read so it had to be replaced with another. This was the first tag failure we have had.

A peregrine falcon was seen flying low over Ship Rock and scaring up gulls, but it flew off without further hunting.

February 1, 2007: Fraser Cove, Trailer. Low tide -1.0 at 1548 hrs.. The sky was mostly sunny, winds were moderate, waves were moderate to light. Generally very good conditions. With Lyndal Laughrin leading the way, we drove out to Fraser Point on roads much better than we expected. We got to Fraser Cove at about 1400 hrs. Carol collected plates and tuffies, Allison installed a pressure logger below plot M2, and Susie counted 149 *Pisaster ochraceus* in a 30-minute search. I searched for abalone finding none.

We got to Trailer site about 1530 hrs. Susie counted seastars again finding 85 in a 25 minute count covering mainly the mussel plot reef. Carol replaced plates and tuffies. I searched for black abalone from the mussel reef to the edge of the reef south of the site about 100 m. In total, I found 52 black abalone in a one-hour search. We re-sighted 14 abalone that had previously been tagged in December. This included the one near the mussel plots that I tagged in December that was still in the same crevice (where it has been for years). The smallest I found was about 70

mm. Most were over 130 mm with the largest at 168 mm. No sign of withering syndrome was seen in the abalone though I did see purple urchins that appeared to be sick (losing spines). The abalone were generally higher in the intertidal than I would have expected. *Tetraclita rubescens* were on some shells but not most were very clean with little wear on the shell. We found one fresh shell (142 mm) that was perfectly clean.

*Addendum: I was contacted by Ev Ashworth, a Ventura resident whose son Henry was looking for a science fair project in January. They had previously talked with Lotus Vermeer (TNC) and Chris Mobley (CINMS) about Henry's desire to study black abalone. We discussed the work I started at Willows which was where Henry wanted to do his studies, and some things he could do to study abalone without disturbing the abalone or current research. They decided to buy their own Pocket Reader and to try to map the abalone locations at Willows Anchorage.

They went to Willows on March 3rd, and found 18 black abalone, ten of which were tagged. They found two fresh shells and brought them to me. One was 65 mm with no tag and one was 71 mm with tag 0974705. It was tagged on 1/31/07. The shells were found in the inshore area at the bottom of a tidepool. Henry had collected some habitat information along with GPS locations. I gave him copies of our site map and datasheet and we discussed information he can collect next time. They hope to continue visiting the site once or twice a month over the next year.

San Miguel Island February 13-17, 2007

(Database event #2007-B)

PURPOSE: To tag black abalone, *Haliotis cracherodii*, at Otter Harbor to study within-site movement, survival, and recapture rates of individuals. Using rough sketches and GPS Garmin waypoint tracking, we mapped spatial distribution of black abalone and collected descriptive data on habitat occurrence and nearest neighbor. Two successive visits following initial tagging allowed us to evaluate tag retention, examine abalone response/movement following tag placement, and to tag additional individuals.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Melissa Neuman, NMFS, Endangered Species Protection Unit, Long Beach

PROCEDURE and general observations: Black abalone were tagged with Biomark™ PIT tags and shell length was recorded to nearest millimeter. Unique tag numbers were read with a Biomark Pocket Reader and recorded to a special datasheet. PIT tags were buried in a small amount of Z-Spar marine epoxy and attached to the outside of the shell. Untagged abalone (i.e. those in narrow crevices inaccessible to tagging) were enumerated. Nearest abalone neighbor (NN; touching, centimeters away, less than 0.5 meter, > than 1-5m away) was noted.

13 February, Otter Harbor (Day 1). Low tide -0.4 ft. at 1351 hrs. Windy (15-20 knots) but not raining. Arrived at Dry Lake Bed via CIA's *Islander* at approximately 1215, stashed extra gear there, and proceeded to hike 45 minutes down to the Otter Harbor site. A light shower occurred during the walk, but cleared by the time we arrived on-site. There were 32 harbor seals hauled out within the site boundaries. Up to seven black oystercatchers were on the reef. A general field log was not completed this day. We were on site from 1315-1515. We left the site early to open the research station before dark.

Twenty-three (23) PIT tags were affixed to live black abalone on the first day of tagging. Within the area covered we found an additional 68 abalone that were not tagged, usually because they could not be accurately measured. We worked west from about plot 355 to about 30 m past site reference bolt R2 today. An alpha character "map ID" (A-W), the Pocket Reader log number (2-25), the PIT tag number, the shell length (in mm), and "comments" (including habitat description and Nearest Neighbor (NN)), was recorded to the datasheet. GPS position using a handheld Garmin unit, was not recorded this first day. In lieu of that, a relative position was noted on both a RI monitoring site map and the day's site sketch (on Never-tear paper). The first seven (A-G) PIT tags employed fell within the RI map boundary. The remaining 16 individuals tagged occurred past the R2 bolt, and were only recorded on the site sketch. Site sketches attempted to give reference to nearby topographic features (crevices, channels, rock shapes, pools) and estimates of distance when possible.

14 February, Otter Harbor (Day 2). Low tide -0.8 ft. at 1423 hrs. Conditions were clear, swells moderate, approximately 20 knot winds from NW. We were on site from 1315-1645 hrs. We

arrived earlier in the tide cycle and only 16 harbor seals were hauled out. There were four black oystercatchers and at least eight western gulls.

Today we worked east from about plot 356 to the reef end (all the way out to end of mussels on point). We worked past the R1 reference bolt approximately 8 meters. A Garmin Vista GPS used to log recaptures, and new tag deployments (logged by tag number). We tagged 29 black abalone with a size range of 57-145 mm. We found an additional 48 that were not tagged.

A sketch of the area surveyed, in three distinct sections, was made (See sketches 1-3, dated 14 Feb 2007). A double-alpha system was used today (AA-ZZ,A-C) for recording positions to the sketch.

Plot repairs were made to mussel plots: myt 375: LR; myt 378: LR,LL; and myt 379: LL.

15 February, Haithuan Reef and Otter Harbor (Day 3). Low tide -1.1 ft. at 1454 hrs. Clear skies, wind dropping slightly to 10-15 knots, swell moderate. Santa Ana winds forecasted but never really materialized on island as NW wind prevailed all day. We were on site at Otter Harbor from 1350-1600 hrs. A Field log was completed for this day. A Garmin GPS was used to mark “grouped” recaptures and new tag deployments (logged by tag number).

We measured about 170 black abalone on the reef approximately 500 m east of the Otter Harbor site (occasionally known as Haithuan Reef for the fishing boat once wrecked there). Many of the sizes had to be estimated because abalone were too far back in crevices to be measured. Though some would have been good candidates for tagging, most were not easily reachable. No abalone were found here under 50 mm and several were over 170 mm, which is quite large for a black abalone. There were nine black oystercatchers in the area, and at least 46 harbor seals were present on the reef between Haithuan and the Otter Harbor site.

At our site there were 16 harbor seals, and four black oystercatchers and one American oystercatcher. At the site we relocated 44 of the 52 black abalone tagged on the previous two days and tagged an additional 14 abalone on the west side of the site (the area worked on 2/13). Most of the abalone recaptures did not appear to move overnight except one that could be seen deep in a crevice too narrow for the tag reader to get within range.

16 February, Leuzarder Point and Chinese Point. Low tide -1.2 ft. at 1525 hrs.

At Leuzarder Point, we were on-site from 1250-1530. We measured 105 black abalone noting distance to nearest neighbor. Sizes ranged from 65-168 mm. We also found two red abalone (176 and 195 mm).

At Leuzarder Point, Dan and Susie measured approximately 100 owl limpets, *Lottia gigantea*. Their sizes ranged from 22-86 mm. Seastars were counted (*Pisaster ochraceus*: 104 small(<75mm), 35 med(75-150mm), and no large; *Pisaster giganteus*: 1 small; *Patiria miniata*: 13 small).

At Chinese Point, we were on-site from 1615-1700. Only two abalone were found (118 mm, single; 161, single).

At Chinese Point, owl limpets were measured by Dan and Susie, with Melissa recording. *Lottia gigantea* sizes ranged from 29 - 94mm.

Santa Cruz and Anacapa Island March 14-17, 2007

(Database event #2007-C)

PURPOSE: Rocky intertidal monitoring at sites on Santa Cruz and Anacapa Islands. Boat time on this cruise also supported seabird biologists and botanists providing access to Scorpion Rock, Prince Island, and Middle Anacapa.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Tal Ben-Horin, UCSB graduate student (3/16)
Carolyn Greene, Naturalist Corps volunteer (3/17)

Additional personnel: Terrance Shinn, Charlie Lara, Josh Adams, Sarah Chaney, David Mazurkiewicz (Growing Solutions), Dirk Rodriguez, Anna Braswell.

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. Motile invertebrates were counted in all the photoplots except for two *Tetraclita* plots at Orizaba Cove and the 12 plots at Anacapa Middle-East. Sub-sampling of motile invertebrates was performed for littorines and small limpets, using three 20x20 cm, or 10x10 cm, subplots where noted. Sea stars and abalone were counted and measured at all sites using a timed-search method. The maximum number of shorebirds and pinnipeds seen at any one time was recorded. Cat Rock was not visited because of south swells and the presence of harbor seals on the beaches. Daylight savings time went into effect this week so we had to adjust the tide calendars.

14 March 2007, Scorpion Rock: Low tide -0.4 ft. at 1404 hrs. Water temperature was 13°C. Conditions were excellent. The wind and seas were calm, the morning fog lightened up at mid-day. There were as many as seven black oystercatchers in the area and a pair of American oystercatchers. One harbor seal was swimming in the Little Scorpion Anchorage. We were onsite from 1015-1600 hrs.

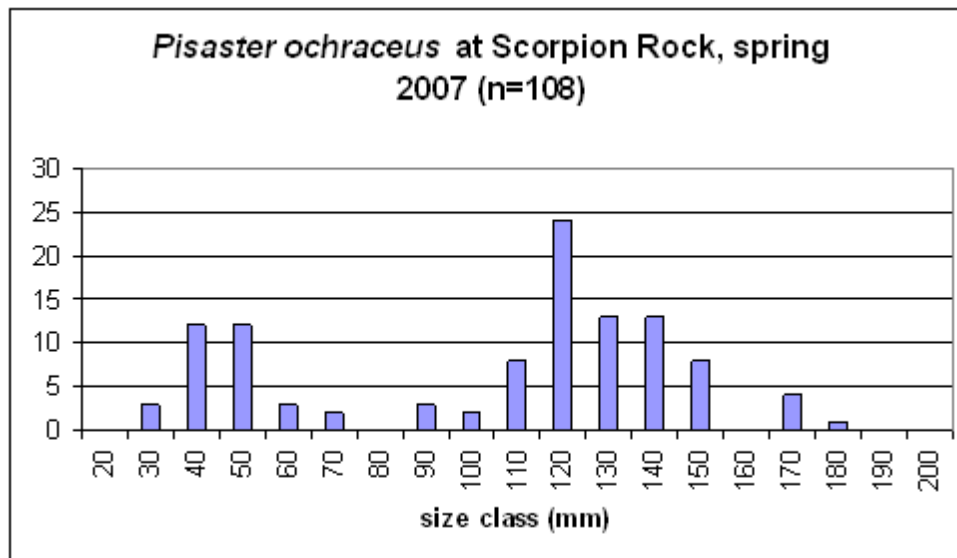
We departed Ventura 8000hrs and returned at 1730. Josh, Sarah, and David worked up on Scorpion Rock most of the day, installing five new artificial nest boxes for Cassin's auklets, spraying kikuyu grass, and discussing restoration possibilities. Susie and Dan worked the *Hesperophycus* plots until 1130, and then got a lift over to the other plots. All monitoring was completed. On the monitoring rock, 108 *Pisaster ochraceus* were found including 13 at 150 mm or larger and 32 under 75mm. No abalone were found.

Purple sea urchins, *Strongylocentrotus purpuratus*, were common in the tidepool and below the tideline around the rock, and all seemed healthy. *Endocladia muricata* was doing very well and occupied large parts of almost all the barnacle zone plots. *Endocladia* cover was fairly high in all but the *Mytilus* zone. *Tetraclita rubescens* were doing better than recent years with some large barnacles occupying the lower zones. *Tetraclita* cover was actually greater in the *Mytilus* zone.

Mytilus californianus were abundant, but most were small (under 40mm). *Hesperophycus californicus* and *Silvetia compressa* both looked healthy. Numerous *Septifer/Brachydontes* were found in the *Hesperophycus* plots. Motile invertebrates were fairly diverse in the plots and *Ocenebra circumtexta*, *Nuttallina* sp. and *Fissurella volcano* were the most numerous species. *Ocenebra* were particularly common in the mussel zone.

Photoplot summary – mean % cover by zone at Scorpion Rock, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	34.2	24.6	0.4	36.8	0.0	0.0	0.8	0.0	0.4	1.8	1.0	0.0
Endocladia	9.8	0.4	0.4	66.6	0.0	0.0	4.0	0.0	1.0	17.6	0.2	0.0
Mussels	17.4	0.0	24.8	0.2	0.0	0.0	38.0	3.4	0.6	14.4	1.2	0.0
Tetraclita	60.8	0.0	15.2	4.6	0.4	0.0	12.0	0.0	0.2	5.0	1.8	0.0
Hesperophycus	26.2	0.0	0.0	19.4	38.0	11.6	0.4	0.0	0.0	4.4	0.0	0.0



15 March, Orizaba Cove. Low tide -0.7 ft. at 1436 hrs. Water temperature was 14°C. Excellent conditions again, calm and foggy. There were four black oystercatchers in the area and two western gulls were feeding in the mussel bed. About 60 brown pelicans and more gulls were present on Orizaba Rock. I heard a belted kingfisher. There was one harbor seal hauled out on the rocks across from the plots. We were onsite from 1000 to 1630 hrs.

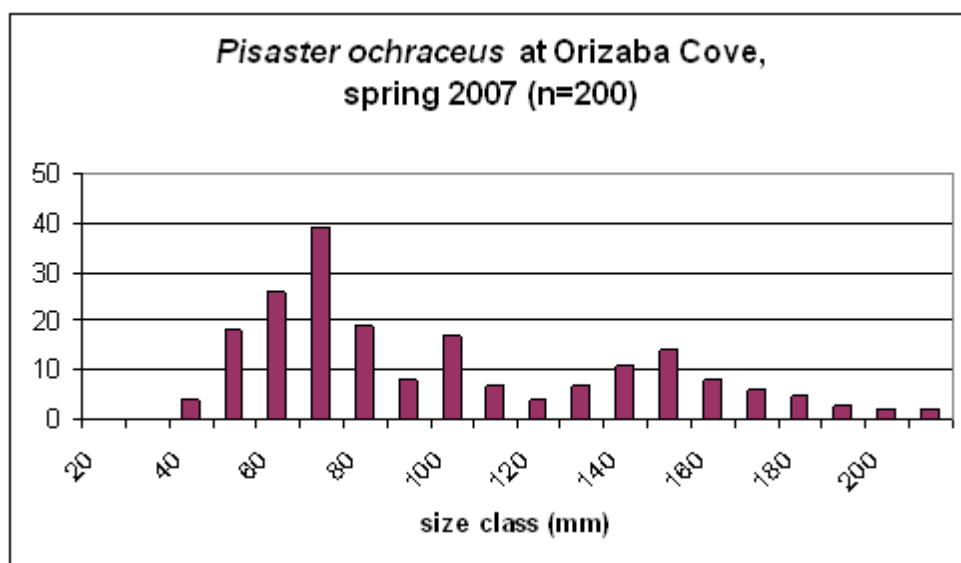
We departed Ventura 0730 hrs. and dropped Dirk and Anna at Middle Anacapa at 0830 for vegetation monitoring. We then proceeded to Cat Rock where we decided the south swell was more than we wanted to deal with on a surf landing there. Change of plans, and Susie and I were dropped off at Orizaba Cove at 1000. Josh and Sarah then went on to Prince Island to check on the auklet situation there. The boat returned at 1600 and we quit work at 1630 to pick up Dirk and Anna. We completed all the monitoring except counting motile invertebrates in two of the *Tetraclita* zone plots. It was a successful day for all. We were back to Ventura at 1900.

The *Hesperophycus* plots were just barely exposed when we landed. Susie counted motile invertebrates again and I scored plots. Photos went well with enough fog cover that we didn't need to use the screen. At 1430 hrs. we took a break from the plots and I counted seastars while Susie measured them. I counted 503 *Pisaster ochraceus*. Most were in the mid-size range though there were quite a few large and small stars as well. Many were in the 50-80 mm size range usually in large aggregations. There were two *P. giganteus*. We found three *Haliotis cracherodii* (39, 45, 56mm). One was in plot *Silvetia* 2 the others were near *Mytilus* 1 and 2.

Rockweeds looked healthy and are becoming more abundant. All plots had a mix of both *Hesperophycus* and *Silvetia*. *Hesperophycus* plants were a mix of both young and old plants. *Tetraclita* was common with some very large individuals present. *Mytilus* dominated in all the *Tetraclita* plots. *Mytilus* plots 1&2 had some partial clearing but seemed to have good recruitment. Barnacle cover was still high but there did not appear to be much recent recruitment. *Endocladia muricata* was abundant all over and dominated most of the *Hesperophycus* plots. *Nucella emarginata* were common in plots. They were probably more abundant in the mussel plots than it appeared because the dense mussels made it difficult to see them. *Nucella* eggs were common and we found many drilled mussels. *Ocenebra circumtexta* were common in most of the plots. *Acanthina* sp. were uncommon with only a few found, all in the *Silvetia* zone. *Littorina* spp. were common.

Photoplot summary – mean % cover by zone at Orizaba Cove, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus (Barnacle)	27.6	60.0	2.2	0.6	0.0	0.0	4.2	0.0	0.0	5.2	0.2	0.0
Silvetia (Rockweed)	11.0	0.0	3.4	11.8	22.2	23.6	11.8	0.0	0.0	16.2	0.0	0.0
Mussels	3.4	0.0	1.8	0.0	0.0	0.0	88.4	0.0	0.0	6.0	0.4	0.0
Tetraclita	13.0	0.0	15.8	0.8	0.0	0.4	65.4	0.0	0.2	3.8	0.6	0.0
Hesperophycus	4.6	9.6	0.6	30.8	29.4	5.0	12.0	1.2	0.0	6.6	0.2	0.0



16 March Middle Anacapa Island- all sites. Low tide -0.8 ft. at 1508 hrs. The water temperature was 14°C. The weather conditions were the same; calm and foggy. There were five black oystercatchers in the area and a harbor seal with an older pup in the water nearby. We were on site from 1000 to 1630, though we had to wait 40 minutes for the tide level to drop.

Dan scored plots at both Middle West and Middle East, being able to walk between sites at the top of the surge channel. The skiff was used to access Middle East with the photo frame however. *Silvetia* was pretty ragged in some areas (plot 456 in particular) but looked healthy and lush in other areas. *Mytilus californianus* were abundant but the bed had thinned out a little in spots (tag corner of plot 466 was exposed for the first time in a couple years), but there were not bare areas. *Tetraclita rubescens* were abundant and mostly large but there were some small individuals present also. Chthamalus/Balanus were present all over the site but cover was low, only 14-64% at ANMW and 1-9% at ANME, with all but one plot only having 20% or less barnacle cover. *Endocladia* was abundant and lush, though the percent cover (13-25% at ANMW and 10-38% at ANME) never seems to fully reflect that. Not much difference was noted between the two sites. New *Egregia menziesii* plants were present along the edge of the reef and were especially common at Harbor Seal Arch.

Dan checked Harbor Seal Arch and found no abalone in the area. We did find six black abalone at Middle West, mostly by the western point and one next to plot 448. Sizes ranged from 52-120mm. Susie counted 255 *Pisaster ochraceus* in a 30 minute count. Sizes ranged from 40 -200 mm radius, with the heaviest distribution in the small (<75mm) size category. Motile invertebrates were numerous in all zones with abundant *Nucella emarginata* and *Ocenebra circumtexta*. Chitons, *Fissurella volcano*, *Pachygrapsus crassipes*, *Acanthina* sp. and *Lottia gigantea* were all common.

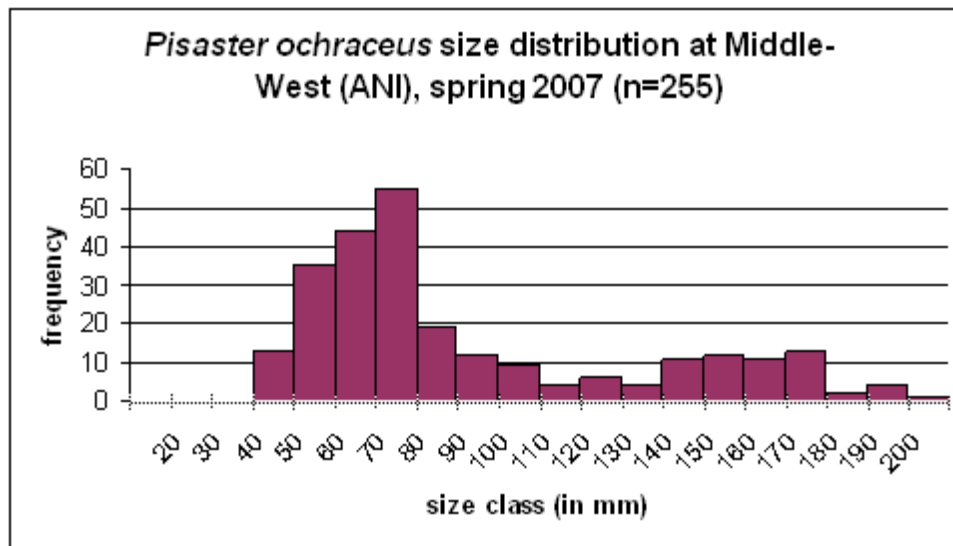
Caulacanthus ustulatus was essentially the same as last fall. It was still present just around plot 261 at ANMW and around plot 53 at ANME. It was present but rather dull looking at Harbor Seal Arch. It was rather extensive at the eastern end of the ANMW reef near the surge channel. It was there before but may not have been added to the notes. *Sargassum muticum* was present in the tidepool by plot 458.

Photoplot summary – mean % cover by zone at Middle Anacapa East, spring 2007 (3 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Barnacle	55.7	5.3	14.3	11.3	0.0	0.0	3.7	0.0	0.3	9.0	0.3	0.0
Endocladia	26.3	4.7	8.7	22.7	0.0	7.3	6.0	1.0	0.0	23.0	0.3	0.0
Silvetia	9.0	2.3	2.3	2.0	0.0	40.3	18.0	2.0	0.0	24.0	0.0	0.0
Mussels	2.7	0.0	1.3	0.0	0.0	0.0	89.7	0.0	0.0	5.3	1.0	0.0

Photoplot summary – mean % cover by zone at Middle Anacapa West, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Barnacle	36.4	25.8	0.2	15.0	0.0	0.0	3.0	0.4	0.0	18.8	0.4	0.0
Endocladia	38.8	9.8	0.8	17.4	0.0	0.0	17.6	0.0	0.2	14.8	0.6	0.0
Silvetia	22.0	0.4	1.4	5.2	0.0	36.4	5.2	2.2	0.0	25.8	1.4	0.0
Mussels	14.8	0.0	0.8	0.0	0.0	0.0	72.6	0.0	0.0	10.6	1.2	0.0



17 March South Frenchy's Cove, Anacapa Island. Low tide -0.8 ft. at 1539 hrs. The weather was calm and foggy. There was some surf on the south side but it was light and did not impede sampling. No water temperature was taken. There were three black oystercatchers in the area and one western gull on the reef. To the west there was a wandering tattler and a rock wren down on the intertidal rocks. I attempted to walk to Cat Rock but a dozen or more harbor seals were on the rocks and beach just east of the site. We were on site from 1100 to 1530 hrs.

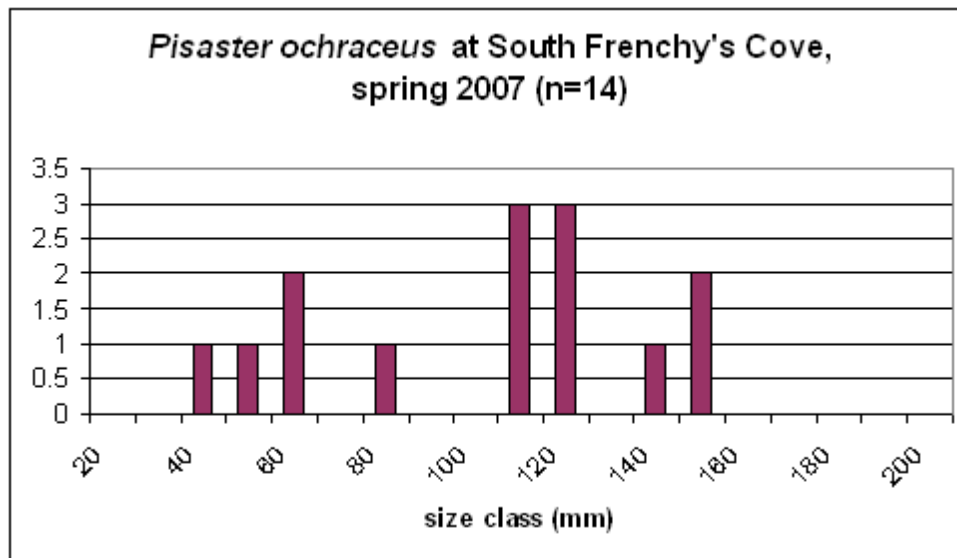
The mussel beds on the outer reef were doing well and there seemed to be good recruitment with dense patches of small *Mytilus Californianus* being common. *Mytilus* cover ranged from 58-89%. *Septifer/Brachydontes* were common especially on the inner reef. *Endocladia* was doing very well as it has been everywhere else, and cover was high (48-88%). *Silvetia* and *Hesperophycus* were both looking bleached and somewhat ragged, but this isn't their growing season and there was still fair cover present (13-80%). Something happened and that the photo of plot 259 did not record, so that image is missing from the set. *Chthamalus/Balanus* were common, with 52-69% cover in the barnacle plots. *Anthopleura elegantissima* seemed to have lost ground along the edges of the inner reef. We don't monitor this species, but subjectively it seemed less common than years ago. This site is exposed to a great deal of sand inundation. Though the reef tops may not be buried, the fine black almost silty sand is present everywhere and may be a factor is why this site has fewer invertebrates and seems different than other sites.

Dan searched for seastars and found five on the outer reef and nine more on the “BLM reef” to the west. There was a high diversity of algae on the outer rocks and several patches of moon sponge, *Spheciospongia confederata* were noted among the outer rocks.

Note because of rough seas and lack of days, Cat Rock was not visited in spring 2007.

Photoplot summary – mean % cover by zone at South Frenchy’s Cove, Anacapa Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Barnacle	21.0	61.6	0.0	13.0	3.4	0.0	0.0	0.0	0.0	0.4	0.4	0.2
Endocladia	11.8	2.6	0.0	67.6	1.2	6.4	7.2	0.0	0.0	2.8	0.2	0.2
Silvetia	20.0	11.2	0.0	4.0	0.0	52.4	0.2	0.0	0.0	12.0	0.2	0.0
Mussels	11.4	0.0	0.0	0.0	0.0	0.0	74.2	3.0	0.0	10.6	0.8	0.0



Santa Cruz Island March 25-30, 2007

(Database event #2007-D)

PURPOSE: Rocky intertidal monitoring at sites on Santa Cruz Island.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park

PROCEDURE and general observations: Transportation to and from Santa Cruz Island was via Island Packers boats. We stayed at the UC NRS field station and rented a UC land cruiser. We camped three nights at Christy Ranch. 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, using three 20x20 cm, or 10x10 cm, subplots where noted. Sea stars and abalone were counted and measured at all sites using a timed-search (generally 30-minutes) method. Surfgrass was scored in fixed transects (10 meters, 100 points) at Fraser cove and Trailer. The maximum number of shorebirds and pinnipeds seen at any one time was recorded. We spent two days at Willows Anchorage, with the second day devoted to locating, measuring, and tagging black abalone.

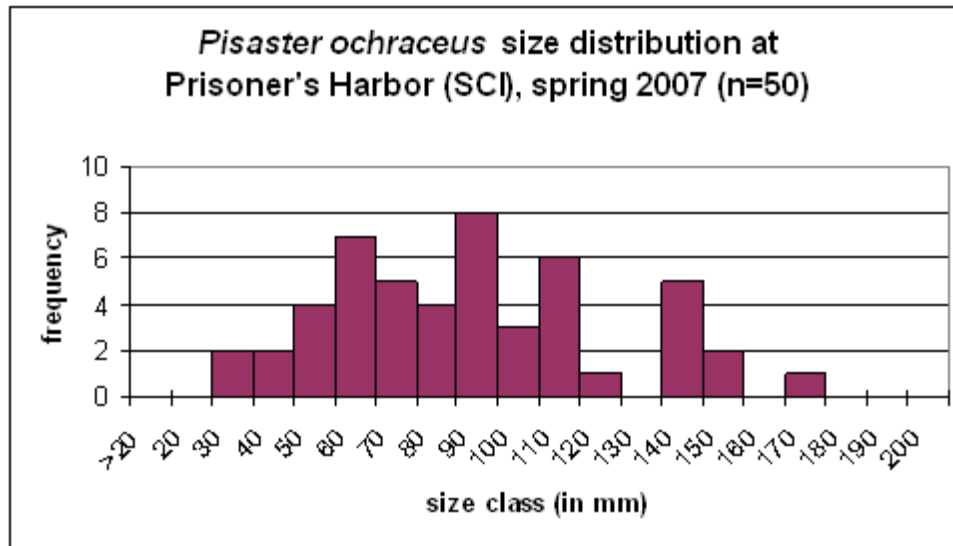
25 March 2007, Prisoners Harbor: Low tide 0.0 ft. at 1122 hrs. Water temperature was 15°C. Conditions were excellent. The wind and seas were calm, the morning fog lightened up at mid-day. The only birds on the shore were two western gulls and a sandpiper (probably a western sand piper). We were on site from about 1130-1530 hrs.

We departed Ventura after 0900. The boat stopped at Scorpion to offload passengers. There was a starving elephant seal pup at Scorpion, probably washed off a beach elsewhere. We immediately went to work in the intertidal on arrival at Prisoner's. We drove to Christy Ranch in the evening to camp out at the adobe while working at the west end of the island.

There were still bare patches in the mussel beds with diatoms, *Endarachne binghamiae*, and *Ulva* sp. growing on the rock. The other mussels are generally several layers thick. *Mytilus californianus* recruitment has been high. We noted that there were many empty mussel shells still attached in the bed. There were also quite a few dead, gaping mussels. *Nucella emarginata*, *Acanthina* spp. and *Ocenebra circumtexta* were all abundant. There were *N. emarginata* eggs in most of the mussel plots. *Endocladia muricata* was very lush. Both rockweeds, *Silvetia compressa* and *Hesperophycus californicus*, seemed rather sparse over the site, however individual plants looked healthy and had reproductive conceptacles. *Balanus glandula* appeared dense at first glance but on closer inspection, many of the tests were empty. I would speculate that the calm relatively warm days combined with the daytime low tides may be the cause of the dead mussels and barnacles. *Chondracanthus canaliculatus* was lush and abundant. *Sargassum muticum* was present. In a 30-minute search for seastars I found 48 *Pisaster ochraceus*, but the search was not started until 1400 hrs. and the tide was moving back in.

Photoplot summary – mean % cover by zone at Prisoner's Harbor, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	33.2	12.6	0.4	25.4	0.0	0.0	0.8	7.6	0.0	19.2	0.8	0.0
Endocladia	30.0	4.6	0.2	47.6	8.8	0.0	1.2	0.0	0.0	5.2	2.4	0.0
Silvetia	31.0	6.6	2.4	7.0	0.0	17.8	3.6	2.4	0.0	28.4	0.8	0.0
Mussels	1.4	0.0	0.0	0.0	0.0	0.0	97.6	0.0	0.0	1.0	0.0	0.0
Hesperophycus	29.2	15.4	0.0	20.6	16.4	0.8	0.8	0.2	0.0	15.6	1.0	0.0



26 March 2007, Fraser Cove, Trailer: Low tide -0.2 ft. at 1238 hrs. Water temperature was 13°C. Conditions were excellent. The wind and seas were calm, about the calmest I have ever seen there. A thick drizzly morning fog lightened somewhat at mid-day. There were five black Oystercatchers, one ruddy turnstone and 10-15 sanderling at Forney's. At Fraser I saw 10 black oystercatchers, one American oystercatcher, and two black turnstones. At trailer there were at least five black oystercatchers and four western gulls. We were on site from 0900-1730 at Fraser Cove including the Forney's Cove area. Because high winds and surf were predicted for 3/27, I went to Trailer site from about 1200-1530 hrs. to shoot photos, score surfgrass transects and mussel photoplots, and count seastars.

The mussel beds at both sites were generally only one layer thick in contrast to the dense bed at Prisoners. There were still abundant mussels at both sites. Susie pointed out the sand at Fraser, speculating that may be why the numbers of *Nucella emarginata* and other snails may be less abundant there. *Porphyra perforata* was abundant at both sites especially in the *Mytilus* and *Endocladia* zones. Both rockweed species were abundant and healthy at Forney's. *Chthamalus/Balanus* were very common but there was a relatively high percentage of empty tests, as we had seen at Prisoners. Tar abundance in the tar zone plots (40-58% cover) seemed low, with more barnacles present than ever before.

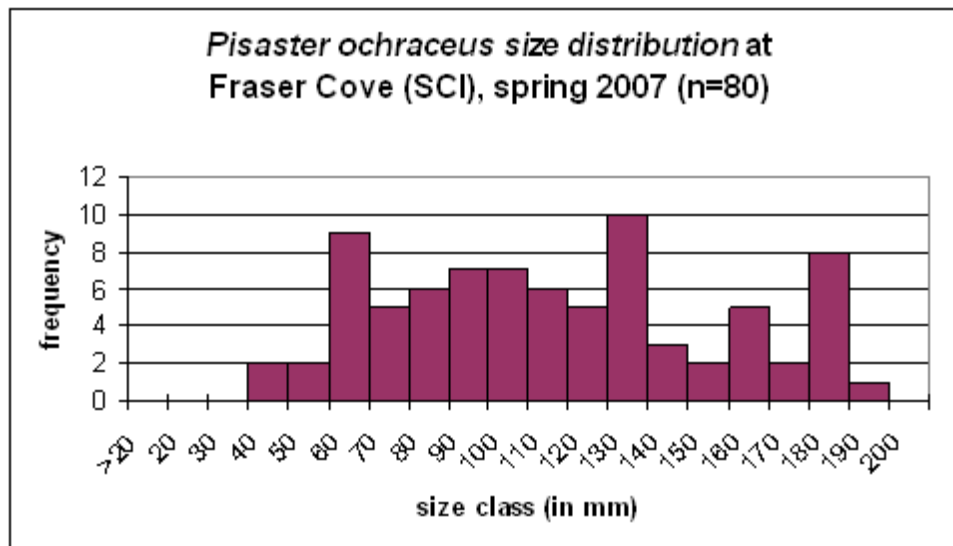
Susie counted 70 *Pisaster ochraceus* at Fraser Cove, with a broad range of sizes (40-190 mm). No abalone were found there. I found 46 small and 146 medium *P. ochraceus* at Trailer. I also found 7 *Haliotis cracherodii* at Trailer, with sizes ranging from 65-150 mm. (One more was found on 3/27). Surfgrass cover was low (22-45%) at Fraser Cove, and there was high

occurrence of bleaching and abrasion of the blades. *Phyllospadix* cover at Trailer was higher with 45-82% cover, and both bleaching and abrasion were much lower than at Fraser. At both sites, various red algae or articulated coralline red algae were the next most common group.

There was a dead sea lion on the beach at Forney's Cove.

Photoplot summary – mean % cover by zone at Fraser Cove, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	22.6	40.4	0.0	6.6	0.0	0.2	13.0	0.0	0.2	16.2	0.2	0.6
Endocladia	19.0	2.8	0.0	68.2	1.6	0.0	2.2	0.0	0.0	5.8	0.2	0.2
Silvetia	15.8	9.4	0.0	9.0	7.0	49.8	0.0	0.2	0.0	7.6	1.2	0.0
Mussels	17.6	0.0	0.0	0.0	0.0	0.0	75.2	0.2	0.0	4.8	2.2	0.0
Pollicipes	22.8	0.4	0.6	3.0	0.0	0.0	52.4	0.0	5.4	2.6	12.8	0.0
Tar	21.4	28.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	46.0
Hesperophycus	25.4	10.6	0.0	15.2	38.8	7.2	0.0	0.0	0.0	2.8	0.0	0.0



**Surfgrass transects at Fraser Cove, spring 2007
(additional taxa with 0 values deleted from table)**

Location: Fraser Cove

Site Code: SCFC

Date: 26-Mar-07

Recorders: Dan Richards

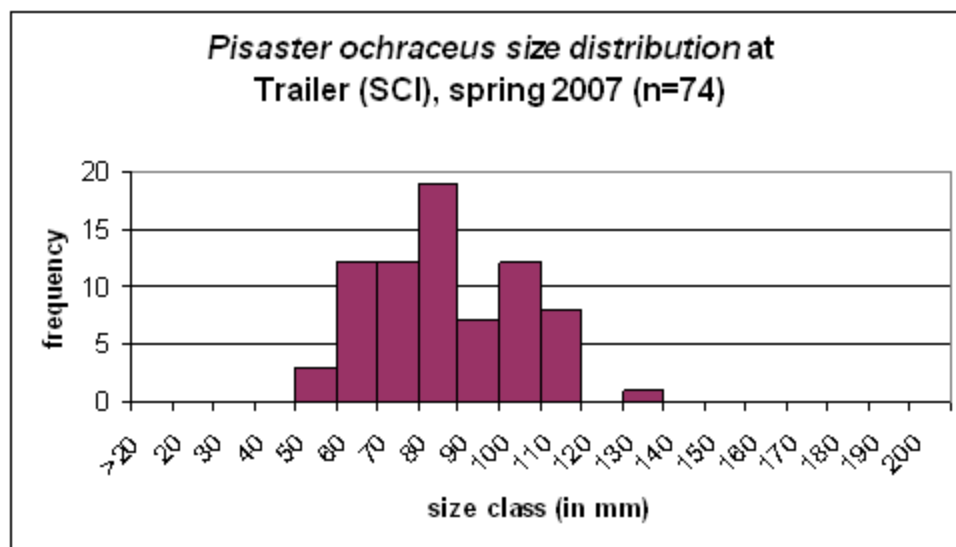
Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Rock	2	3	2
Egregia menziesii	2		
Erect coralline	2	3	4
Encrusting coralline		1	2
other red algae	12	27	47
Phyllospadix sp. overstory	82	65	45
Phyllospadix sp. understory	2		
Other green algae		1	
total	102	100	100

27 March 2007, Trailer: Low tide -0.3 ft. at 1332 hrs. Water temperature was 13°C. The day was partly cloudy, cold, and windy (25-30 kts) with high surf. We did not get any rain during the night as hoped for. Conditions were excellent. The wind and seas were calm, the morning fog lightened up at mid-day. We only saw two black oystercatchers today. A bald eagle was flying over the site when we arrived this morning. We were onsite from 0915-1430 hrs.

The surfgrass transects would not have been possible today. I did measure *Lottia gigantea* in plots. Plot L3 had only one owl limpet and plot L5 had none. Both of those were covered by *Porphyra perforata*. We measured 74 *Pisaster giganteus* with sizes ranging from 50-130 mm. Many of the seastars counted on 3/26 were not reachable because of the surge. Some appeared to have moved out of where they had been yesterday. *Tegula funebris* were abundant in both the *Silvetia* and *Hesperophycus* plots. *Tegula gallina* were common in higher pools and cracks. *Acanthina* spp. were also common in the rockweed plots. *Nucella emarginata* were common in two of the mussel plots.

Photoplot summary – mean % cover by zone at Trailer, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero- phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	28.6	58.4	0.2	8.0	0.0	0.0	0.0	0.0	0.0	2.6	2.2	0.0
Silvetia	10.8	6.8	0.0	1.2	0.0	77.4	0.0	0.0	0.0	3.8	0.0	0.0
Mussels	14.8	0.0	0.2	0.0	0.0	0.0	45.0	1.0	0.2	21.8	17.0	0.0
Hesperophycus	21.8	20.0	0.0	17.3	10.8	28.5	0.0	0.0	0.0	0.8	0.0	0.7



Surfgrass transects at Trailer, spring 2007
(additional taxa with 0 values deleted from table)

Location: Trailer

Site Code: SCTR

Date: 26-Mar-07

Recorders: Dan Richards

Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Sand			2
Egregia menziesii		17	1
Erect coralline	27	2	20
Encrusting coralline	7	1	2
Non-coralline crust	1		
other red algae	24	17	29
Phyllospadix sp. overstory	22	45	44
Phyllospadix sp. understory	1	10	1
other green algae		1	1
total	82	93	100

Site Code	Count Density	Area	Density	Count Sized	Mean Size	StDev	Min Size	Max Size
TR	31	12.56	2.467	31	73.26	14.60	41	94

Site Code	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm	%80-89mm	%90-99mm
TR	0.00%	0.00%	0.00%	6.45%	9.68%	19.35%	32.26%	22.58%	9.68%

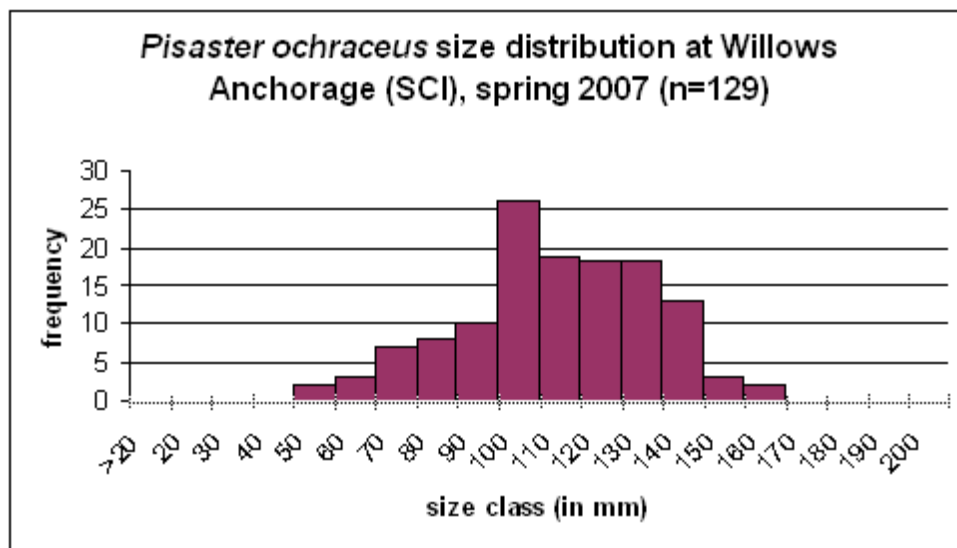
28 March 2007, Willows Anchorage: Low tide -0.4 ft. at 1412 hrs. Water temperature was 13°C. Conditions were excellent. The wind and seas were calm in the cove though blowing offshore. The weather was clear and warm, though cold at night. There were eight black oystercatchers and three surf scoters in the cove. A great Egret was standing on the dense kelp canopy just off the site reef. We were on site from 1100-1700 hrs.

We had some difficulty finding the mussel plots under the dense layers of *Mytilus*, but we found at least one corner of each plot. In general the *Mytilus* were doing very well. Cover was high and recruitment has been high, filling in many of the gaps in the bed. *Tetraclita rubescens* were very abundant on the lower parts of the reef. *Endocladia* was abundant but the clumps of *Endocladia* on the outer reef where the plots are were not as dense as on the inshore reef. Still, *Endocladia* cover ranged from 44 to 76%. The air was hot and dry in the sun and I wonder how much the algae cover is reduced when it is desiccated compared to fully hydrated. Some of the *Hesperophycus* and *Silvetia* plants looked just fine, but many were tattered and there was a lot of open space on the reef. Only two plots in each of the *Silvetia* and *Hesperophycus* zones had rockweed cover. Susie noticed that *Nucella emarginata* seemed smaller overall here compared to other sites. *Nucella* were abundant in the mussel zone. *Acanthina* sp. were common in both *Silvetia* and *Hesperophycus* plots. The *Endocladia* zone had few motile invertebrates.

I found 24 tagged abalone (two were deep in crevices and tags could not be read) and 24 abalone without tags. I recorded GPS locations for all and noted distances to nearest neighbors. The GPS could not give a very accurate readings because of the proximity of the high cliff behind the site. The epoxy of one tag was lifting and came off the shell when tested. The same tag was reapplied to that same abalone on 3/29. There was one other untagged abalone whose shell seemed a little discolored making me wonder it lost a tag. Three fresh shells were found (45, 49, 87 mm).

Photoplot summary – mean % cover by zone at Willows Anchorage, Santa Cruz Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other
Endocladia	28.8	4.8	0.4	63.0	0.0	0.0	0.0	0.0	0.0	2.6	0.4	0.0	0.0
Silvetia	15.6	16.4	0.0	19.0	0.0	26.0	0.0	0.2	0.0	20.2	2.6	0.0	0.0
Mussels	4.0	0.0	1.2	0.0	0.0	0.0	91.8	0.0	0.4	1.4	0.8	0.0	0.4
Hespero-phycus	21.2	23.8	0.0	16.8	1.4	19.0	0.0	0.0	0.0	17.4	0.4	0.0	0.0



29 March 2007, Willows Anchorage: Low tide -0.3 ft. at 1444 hrs. Water temperature was 13°C. Conditions were excellent. The weather was clear and calm. We saw 7 black oystercatchers and one American oystercatcher. We were on site from 1030 to 1630.

The sun was intense on the reef and many of the algae looked desiccated. Animals were retreating to pools if possible. The entire time was spent in search of black abalone. We found 22 previously tagged abalone (two were not readable because of the crevice). One of these was in the western portion of the site (west of plot L5) and was unique to the day. There were three found on 3/28 that were not relocated on 3/29. PIT tags were attached with marine epoxy to the shells of 21 black abalone. We identified zones on our site map and mapped the general location of the abalone that way. There were up to 20 more abalone that were not tagged, and were in positions that prevented accurate measure of tag application. We continued around the point to the west and only found three more black abalone which were not tagged. Four juvenile black abalone (17, 28, 38, 39 mm) were found. Two additional fresh shells were found besides those found on 3/28 (53, 68 mm)

There were several *Megathura crenulata* on the reef. *Aplysia californica* were fairly common and there were even some *Norrisia norrisi* and young *Cypraea spadicea* in the intertidal. Numerous *Pisaster ochraceus* in the 20-40mm size range were found, especially east of the *Endocladia* plots, which were not counted on 3/28. We also noted that *Strongylocentrotus purpuratus* were commonly found with severe to moderate spine loss, an indication of disease.

30 March 2007, Prisoners Harbor: Low tide -0.1 ft. at 1510 hrs. Water temperature was 13°C. Conditions were excellent. The weather was clear and calm. The only birds seen were three common ravens foraging on the reef when we arrived. A harbor seal was swimming around the area. We were onsite from 1150-1345, and then returned to Ventura on Island Packers.

We counted motile invertebrates in the barnacle and *Silvetia* zones and we measured *Pisaster ochraceus* for size frequency. We measured 50 *P. ochraceus* and one *P. giganteus* in 15 minutes. Sizes ranged from 30 to 170 mm with one seen in deeper water that was over 200mm. There was a new opening in the mussel bed that included part of plot M5. I shot pictures of the open patch which was approximately 0.5 x .75m centered around the lower left bolt. That bolt was not visible last week. The open patch joined the older bare patch extending from plot M4. We suspect the wind waves and swell kicked up by the front that went through the area on 3/27 caught the dense multi-layered mussel matrix at the edge of the previous opening. One black abalone was found near the point (87 mm).

Other natural history notes: a saw-whet owl could be heard at the Christy adobe early 3/26. Two saw-whet owls were heard in the Central Valley (all night long) 3/28 and 3/29. A bald eagle was being chased by a pair of red-tailed hawks on 3/29 about 1700 hrs. above Coches/Willows upper canyons. A fox was seen at the Christy ranch on 3/25 and 3/27. Because the water was clear when we left Prisoners, the eelgrass could be seen and it seemed more patchy than usual.

Santa Rosa Island April 10-17, 2007

(Database event #2007-E)

PURPOSE: To monitor rocky intertidal sites at Santa Rosa Island .

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, RI Biological Technician, Channel Islands National Park
Ken Niessen, volunteer

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 where noted. Sea stars and abalone were counted and measured at all sites using a timed-search method. Cover was determined along surf grass transects (10m) with points every 10 cm. The maximum number of shorebirds and pinnipeds seen at any one time was recorded.

10 April 2007. Soledad Beach. The Ocean Ranger arrived at Santa Rosa about 1130 hrs. We transited the south side of SCI because of building seas and wind. After settling into housing, we drove out to Soledad beach to conduct a beach survey and check for snowy plover. We were able to walk the entire beach because the sand was high enough to allow passage around the rocky points even with the high tide. There was a peregrine falcon on a nest on the bluff of Soledad west. Western gulls and a few glaucous-winged gulls were on the beach. There were a couple of common ravens near the mouth of Soledad creek. There was no sign of snowy plovers, and no tracks were seen. A fresh Cassin's auklet carcass was found that had little muscle and so was suspected of having starved. One western gull that had been predated was found, there were two harbor seal carcasses, two elephant seals (including one male over 3m long near the creek) and one sea lion carcass and one sick adult female sea lion exhibiting odd behavior, similar to the domoic acid affected animals.

11 April, East Point. Low tide 0.0 ft. at 1239 hrs. Water temperature 12°C. Clear sky, high wind and huge surf, the largest I have seen at East Point. When we arrived at the site there were approximately 15 brown pelicans, 200 gulls, and 200 cormorants. The gulls were on the rocks, the pelicans and cormorants were on the bluff. There were four black oystercatchers throughout the day on the reef. We were on site from 1000 to 1430 hrs.

Because of the high surf, the surfgrass transects were never exposed and the mussel plots were occasionally washed throughout the day. Therefore there are still motile invertebrates to count in four mussel plots and the transects to score. Two corners are missing from barnacle plots 578 and 579 but there is no problem finding or orienting the plots. We did not do abalone or seastar counts because of the surge and moderate tide. One black abalone (82 mm) was seen in the channel below plot 584. There were a variety of sizes among the *Pisaster*.

The mussel bed was only one layer deep and there were some gaps between mussels. I did not notice any recruitment but I didn't spend much time in the low zones. Both *Silvetia compressa* and *Hesperophycus californicus* were thinly spread throughout the zones. Percent cover of *H. californica* ranged from 5-40%, about the same as last fall. *Silvetia* cover ranged from 14-84%. Most of the remaining plants looked healthy, and there was fair recruitment of *H. californica* with young plants coming up among the *Endocladia muricata*. *Endocladia* cover was 54-74% in the turf zone. *Chthamalus* spp. were very dense over most of the upper parts of the site, however there were many empty tests in the lower zones. Cover ranged from 18-87%, little changed from last fall. *Acanthina* sp. were common. *Nucella emarginata* were present only in the mussel zone. *Tegula funebris* were common in some of the rockweed plots. The number of *Acanthina* sp. and *T. funebris* correlates with the amount of rockweed cover in the plot. *Cladophora columbiana* is one of the more common algae at this site. Juvenile *Pachygrapsus crassipes* seemed common. There were both ochre stars and purple sea urchins that had been tossed up on the reef by waves.

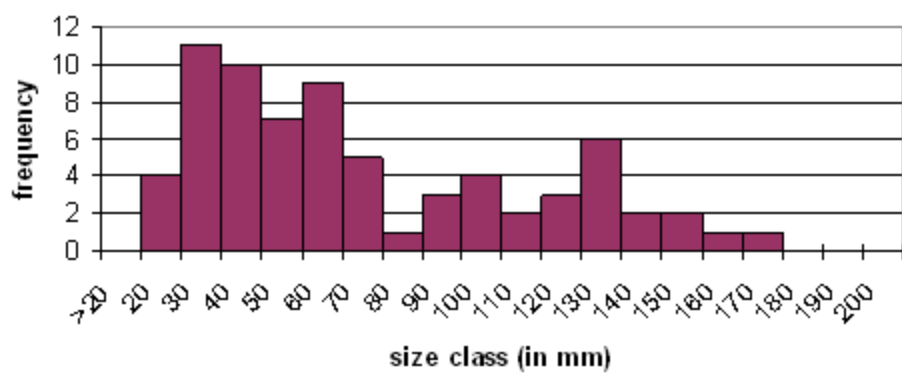
**Photoplot summary – mean % cover by zone at East Point, Santa Rosa Island, spring 2007
(5 plots/zone):**

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero- phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	27.4	53.2	0.0	13.4	3.8	1.4	0.0	0.0	0.0	0.4	0.4	0.0
Endocladia	20.6	0.6	0.0	68.4	9.8	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Silvetia (Rockweed)	32.0	2.4	0.0	6.2	1.6	28.8	12.0	0.0	0.0	16.2	0.8	0.0
Mussels	5.0	1.4	0.0	0.0	0.0	0.0	80.0	1.4	0.2	11.0	1.0	0.0
Hesperophycus	19.6	4.6	0.0	48.6	25.2	1.0	0.2	0.0	0.0	0.6	0.2	0.0

Pisaster ochraceus at East Point (30-minute count)

count	71
min	20
max	170
mean	71.40845
stdv	41.06774

Pisaster ochraceus at East Point (SRI),
spring 2007 (n= 71)



Surfgrass transects at East Point, spring 2007
(additional taxa with 0 values deleted from table)

Location: East Point		Site Code: SREP	
Date: 16-Apr-07		Recorders: Dan Richards	
Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Sand			8
Erect coralline			2
other green algae			9
other red algae			8
Phyllospadix sp. overstory	nd	nd	73
Phyllospadix sp. understory			
total	0	0	100

NOTE: nd = no data, b/c T1 & T2 were underwater

12 April, Johnson's Lee. Low tide -0.2 ft. at 1320 hrs. Water temperature 11°C. We had clear sky and high winds again. Northwest winds 25-30 mph. the surf was huge, over 8 ft. There was one elephant seal weaner on the back part of the site. One Harbor seal was seen watching us from the water and there was one black oystercatcher further down the reef. The sand is mostly gone, leaving the back beach and tidepool back at bare rock. We were on site from about 1020-1420 hrs.

The waves never stopped washing over the lower plots. Because of unsafe surf and whole areas covered with water most of the time we did not attempt abalone or seastar counts. A juvenile *Pisaster ochraceus* was seen but few others were noticed, probably because of the high water. All of the motile invertebrates were counted except in plot 514. All plots were field scored except plots 510 and 511. We did measure *Lottia gigantea* in all the plots, though plots 1 and 3 were empty. A total of 38 owl limpets were found in the five plots. *Lottia* plots 1-3 were each at least partially buried under sand last winter

Balanus glandula dominated most of the barnacle zone. Most were large, few empty tests were noted. *Endocladia muricata* cover seemed low, ranging from 23-44%, and the individual clumps were small. I suspect there was some negative influence from the winter sand. *Mytilus californianus* seemed normal on the upper reef. There were very few on the lower reef, only one mussel was present in plot 513. *Phragmatopoma californica* was abundant forming large reef structures on the inside of the rock where we run the seastar transect and along the lower bench. Filamentous diatoms were abundant, especially where there had been some fresh bare rock. Motile invertebrates were uncommon in most of the plots, though there were a surprising number in the *Mytilus* plots, even where there were no mussels. Generally, where there was some crevice structure or mussels or *Phragmatopoma*, there were *Nucella emarginata* and *Tegula funebris*. *Nuttallina* spp. were noticeably absent from most plots.

Photoplot summary – mean % cover by zone at Johnson's Lee, Santa Rosa Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero- phyucus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Other
Chthamalus/ Balanus	55.6	41.8	0.0	1.4	0.0	0.0	0.2	0.0	0.0	0.2	0.8	0.0	0.0
Endocladia	54.8	1.2	0.2	31.4	0.0	0.0	10.8	0.0	0.4	0.4	0.8	0.0	0.0
Mussels	25.0	0.0	0.0	0.0	0.0	0.0	11.8	9.6	0.6	35.8	6.0	0.0	11.2

Lottia gigantea measurements at Johnson's Lee. Data are for five plots pooled from site.

Site Code	Count Density	Area	Density	Count Sized	Mean Size	StDev	Min Size	Max Size
JL	48	9.42	5.094	48	47.83	22.07	13	90

Site Code	%<20mm	%20- 29mm	%30- 39mm	%40- 49mm	%50- 59mm	%60- 69mm	%70- 79mm	%80- 89mm	%90- 99mm
JL	10.42%	16.67%	12.50%	12.50%	18.75%	12.50%	4.17%	10.42%	2.08%

13 April, Fossil Reef and Sandy Point Beach. Low tide -0.3 ft. at 1356 hrs. Water temperature was 12°C. Conditions were generally good, with clear sky, 10 mph NW wind, and high surf. There was a lobster trap on the beach. There were five harbor seals on the site. Elephant seal weaners were on the beach to the west. Shorebirds included three black oystercatchers, a wandering tattler, eight western gulls, and a song sparrow who serenaded us all day. We were on site from 1000-1600.

After finishing the site we surveyed Sandy Point from 1615-1700. We found carcasses of two rhinoceros auklets, a grebe and two loons, and a set of western gull wings. Mammal carcasses included three harbor seals, two California sea lions and four elephant seals, one of which was an adult male. Live animals included about 300 gulls, 163 elephant seals (weaners and sub-adults), two black oystercatchers, one American oystercatcher, and 30 black turnstones. There was a considerable amount of kelp wrack and a few pieces of fresh eelgrass. I am still curious about the source of the eelgrass. Several balloons, five tires, various plastic bottles and floats from nets and traps were common.

The site looked good. There was more growth (mostly *Endocladia*) on the reef around plot 615 than I have seen in a long time. Swell prevented some work on the outer reef but we did complete the seastar transect and measured 110 *Pisaster ochraceus* for size distribution. *Pisaster* sizes ranged from 30-140 mm with most in the medium sizes. Seven black abalone were found on the reef, all were large. On the west side reef there we found 25 abalone. Only two were tagged. Most of those were deep in crevices and could not be measured. I had tagged six abalone in January there. One tagged shell was found (empty) on the beach and recovered.

I found several patches of *Silvetia* near the *Lottia* plots that appeared burnt, with blackened tips, and in some cases, entirely black thalli. I took photos but did not make a collection. *Silvetia* all looked good on the main site reef. It seems that there are two forms there; possibly it is *S. compressa* and *S. diegettii*. There was at least one plant in each of plots 615 and 616 (1% cover)

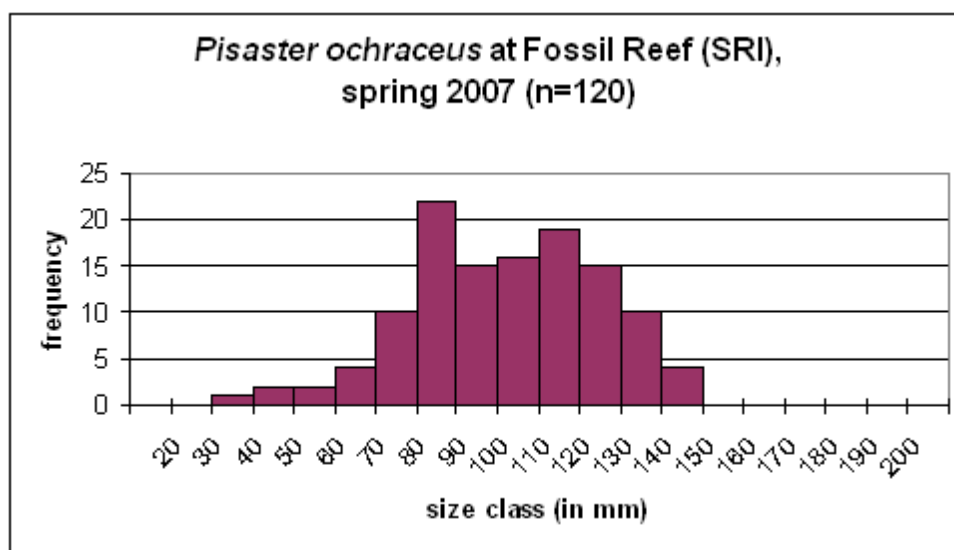
and 44-89% cover in the others. *Mytilus* cover was fairly low (1-48%) with *Phragmatopoma californica* dominating the lower plots. *Endocladia* cover was variable with 8-41 % cover in the plots. Barnacles, mostly *Balanus glandula*, were common in all the barnacle and *Endocladia* zone plots with cover in the barnacle zone ranging from 21-54%. Motile invertebrates were common in all but the barnacle zone where only *Littorina* spp. were abundant. *Nuttallina* sp. were especially abundant in the mussel plots dominated by *Phragmatopoma*. *Tegula funebris* were very common in the *Silvetia* zone. I made a species list while searching for abalone. The pebble crab *Cycloxanthops noveberspinus* was of note.

Photoplot summary – mean % cover by zone at Fossil Reef, Santa Rosa Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	54.4	41.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.2	1.0	1.0
Endocladia	29.2	34.0	1.6	25.4	0.0	7.4	0.0	0.0	0.0	1.8	0.6	0.0
Silvetia	22.2	16.4	0.0	14.8	0.0	41.8	0.0	0.0	0.0	4.0	0.8	0.0
Mussels	17.4	0.0	5.2	0.0	0.0	0.0	20.6	9.2	0.0	29.0	18.6	0.0

Pisaster ochraceus at Fossil Reef (30-minute count)

count 120
min 30
max 140
mean 96.75
stdv 23.34119



14 April, Northwest-Talcott. Low tide –0.3 ft. at 1430 hrs. Water temperature was 12.5°C. The wind and swell were moderate but decreased through the day. The sky was partly cloudy and we got a few drops of rain in the afternoon but not enough to wet the rocks. There were 10 harbor seals on the beaches approaching the site. There were four black turnstones and two black oystercatchers in the area. A song sparrow sang most of the day for us and there were 15 gulls in

the area. Most were western gulls foraging or roosting on the reef; but there were also a couple others (possibly immature glaucus-winged gulls) feeding on the four dead harbor seal pups on the beach adjacent to the site. There was a large buildup of kelp wrack on the beach. We were on site from 1045-1600 hrs.

All the target species were doing well, and all looked very healthy. Barnacle cover ranged from 13-84% with *Silvetia* being dominant in the one plot with low barnacle cover. *Endocladia* cover was only 7-35% in the plots. *Mytilus* ranged from 26-63% cover with *Pollicipes polymerus* having 8 and 9% cover in two plots. Though cover in some of the plots was low, overall everything was doing well. No *Haliotis* or *Pisaster* spp. were found in a 30 minute search. A species list was made. We found several juvenile octopuses, juvenile monkey-faced eels, pricklebacks, northern clingfish, and a blind goby with a ghost shrimp. Chitons seemed numerous and diverse. One juvenile *Pycnopodia helianthoides* was found. Motile invertebrates were moderately abundant in the plots. Some very large (34mm) *Nucella emarginata* were found.

Phyllospadix spp. cover ranged from 60-99% cover in the transects. There was a fairly high (estimated 40%) occurrence of bleaching and high abrasion of plants in transect 3. *Enteromorpha* sp. was the only epiphyte noted on the grass. No flowers were seen in the *P. torreyi*, but I did find flowers on the outer reef among some of the *P. scouleri*.

Photoplot summary – mean % cover by zone at Northwest-Talcott, Santa Rosa Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	36.6	42.6	0.0	1.4	0.0	3.2	12.2	0.0	0.0	2.8	0.8	0.4
Endocladia	46.4	1.2	0.2	26.4	0.0	15.0	0.0	0.8	0.0	9.0	1.0	0.0
Silvetia	30.0	0.2	0.0	3.6	0.0	61.6	0.0	0.0	0.0	3.8	0.4	0.4
Mussels	26.2	0.0	0.4	0.0	0.0	0.0	38.4	1.2	4.0	25.8	4.0	0.0

Surfgrass transects at Northwest-Talcott, spring 2007 (additional taxa with 0 values deleted from table)

Northwest-Talcott

Date: 13-Apr-07

Recorders: Dan Richards

Surf Grass Taxa	Transect 1	Transect 2	Transect 3
Rock		2	12
Sand	1	1	2
Erect coralline		1	2
Encrusting coralline			1
Non-coralline crust			3
other brown algae			1
other green algae			3
other red algae			16
Phyllospadix sp. overstory	99	96	60
Phyllospadix sp. understory			
total	100	100	100

15 April, Ford Point. low tide –0.1 ft. at 1504 hrs. Water temperature was 12°C. The weather was partly cloudy with winds 30 mph from the NW. The swell was mostly moderate with occasional heavy sets. There were four black oystercatchers and three black turnstones. We were on site from 1115-1530 hrs.

A large rock broke off the reef near abalone plot 536 and rolled against the middle bench. There were about six m² of bare rock exposed. Otherwise the site looked about the same as usual except that there were few *Pisaster* on the point. It may have just been too exposed for them with these swells. Most of the sea stars were tucked down among the mussels. I measured 183 in the 30-minute search. No abalone were found. I did find a fresh (31 mm) red abalone shell. I also spent about a half hour on species list notes. *Lithothrix* was found growing in some tidepools. It is not uncommon, but I don't recall it at this site before. *Tegula gallina* was found.

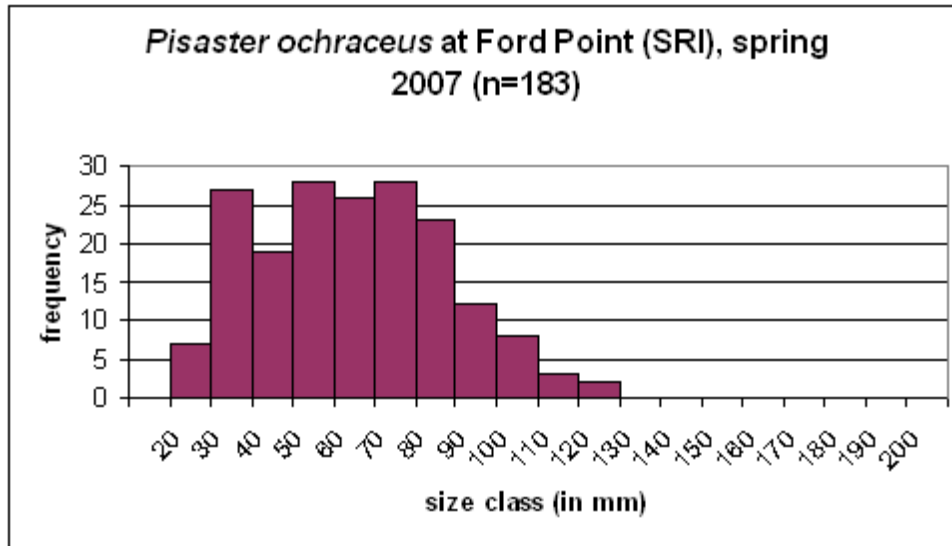
There were a lot of young *Mytilus californicus* growing in plot 532, competing with the *Phragmatopoma californica* and coralline algae. That was the most *Mytilus* cover in that plot in several years. *Mytilus* were recruiting to other areas as well, including plot 530. The mussel plot (534) on the end of the reef had been scoured though and no mussels were in the plot. *Chthamalus* sp. were very dense in patches, though mostly out of the plots.

**Photoplot summary – mean % cover by zone at Ford Point, Santa Rosa Island, spring 2007
(5 plots/zone):**

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero- phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	49.0	40.6	0.0	8.4	0.0	0.0	0.2	0.0	0.0	0.4	1.4	0.0
Endocladia	41.8	0.0	0.2	42.0	0.0	0.0	4.6	1.0	0.0	8.2	2.2	0.0
Mussels	27.8	0.2	0.0	0.2	0.0	0.0	42.4	9.0	0.6	10.4	9.4	0.0

Pisaster ochraceus at Ford Point (30-minute count)

count	183
min	20
max	120
mean	59.67213
stdv	22.98833



16 April, East Point. Low tide 0.3 ft. at 1538hrs. Water temperature was 13°C. Nice conditions held throughout the day, with clear sky, light breeze, and light surf. The tide just never exposed the grass reef. There were about 10 pelicans, 60 cormorants and 20 gulls roosting at the site. Two black oystercatchers were on the reef. We were on site from 1420-1600 hrs.

We did some computer work this morning then walked the beach from the Old Ranch House Canyon Lagoon to Oat Point. We only saw one snowy plover on the beach. Near Old Ranch Creek, there were 12 sandpipers and nine black brant. About 40 mallards, two American coots, and a male surf scoter were on the lagoon there. At ORHC Lagoon there were four mallards and two other ducks either widgeon or teal. There was a fair bit of kelp wrack on the beach, all *Eisenia*. At least 40 *Aplysia californica* were washed up in the wrack along with bits of tunicates and various other invertebrates.

Susie and Ken finished the motile invertebrate counts in the mussel plots. I measured seastars and abalone and made a species list. I scored one surfgrass transect but the water was still over the reef, moving grass and algae around, so trying to score the transects was impractical. Visually, I estimated about 90% *Phyllospadix* spp. cover in transects 1 and 2. Transect 3 was scored as 73%. The grass in transect 3 was thin and abraded, so apparent cover was less. There was sand all across the lower reef, but it was apparently not thick as it didn't cover the transect bolts. *Gracilaria verrucosa* and young *Egregia menziesii* were common among the *Phyllospadix* spp.

Only 71 *Pisaster ochraceus* were found for size frequency measurements. Most of the inner reef was covered in the search. Sizes ranged from 20 to 170 mm with the majority being in the small sizes. Three *Haliotis cracherodii* were found (82, ~140, ~145 mm), two were on the outer reef. There were abundant *Lottia gigantea* around the site mostly in the 50-70 mm size range; though no size measurements were collected.

17 April. Return to Ventura

April 2007 Santa Rosa Island Bird list

Mallard duck
(American widgeon?)
Black Brant
American coot
Surf scoter
Snowy plover
(Baird's?) sandpiper
Black oystercatcher
American Oystercatcher
Black turnstone
Wandering tattler
Dunlin/dowitcher?
Spotted towhee
Song sparrow
Western meadowlark
Horned lark
European starling
Brewer's blackbird
Orange-crowned warbler
Red tail hawk
Coopers hawk
Northern harrier
American kestrel
Peregrine falcon
Great blue heron
American goldfinch
House finch
Common raven
Northern mockingbird
Loggerhead shrike
Brown pelican
Double-crested cormorant
Pelagic cormorant
Brandt's cormorant
Unidentified tern
Unid. loon
Western gull
Glaucus-winged gull
Western grebe

San Miguel and Santa Rosa Islands May 17-22, 2007

(Database event #2007G)

PURPOSE: Rocky Intertidal Monitoring of San Miguel sites, snowy plover counts and carcass counts on Simonton and Cuyler Harbor beaches.

PROCEDURE: We conducted the standard monitoring according to protocol. Photoplots were photographed with Olympus Camedia 5050Z digital camera. Plots were scored in the field except for six plots at Harris Point and two plots at Otter Harbor, which were scored from the images later. Motile invertebrate counts were made in all photoplots. Thirty minute searches were made for black abalone and seastars. Distances to nearest neighbors were recorded for each abalone. At Otter Harbor we searched the entire site for black abalone and read PIT tag numbers if found as well as measuring all the abalone we could. (Black abalone were tagged with Biomark PIT tags at Otter Harbor in February) and shell length was recorded. Measurements of seastars were made of the longest arm (star radius) to the nearest 10 mm.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Ken Niessen, volunteer

RESULTS:

May 18, Harris Point. Low tide was -1.5ft at 0602 hrs. Water temperature was 12°C. There was a heavy marine layer that lasted until noon. The swell was moderate. Winds were light early but had been strong all night and picked up again to 15-20 kts by noon. Seven Western gulls, eight black oystercatchers, and four harbor seals were seen at the site.

No major rock breaks or movement were found. In a thirty minute search we found 10 black abalone (size range 80-165 mm). One group of three and a group of two were within a half meter of others, the others were solitary. We found seven *Pisaster ochraceus* (140-190 mm) and two *P. giganteus*, eight *Patiria miniata*, one *Pycnopodia helianthoides*. We noted clingfish, pricklebacks, *Tonicella lineata*, numerous *Leptasterias hexactis*, abundant *Tegula funebris*, and some *T. brunnea*. *Mastocarpus papillatus* was abundant. Small *Costaria costata* were found. There was not enough time for a general look around the site because of the incoming tide.

Nucella emarginata were common in the *Mytilus* and *Tetraclita* zone plots. *Ocenebra circumtexta* and *Lottia gigantea* were common in some of the plots. *Nuttallina* sp. were common in the *Tetraclita* zone. *Lasaea* sp., a small clam, was numerous in several of the plots.

We surveyed Simonton Beach in the afternoon. No snowy plovers were seen. Twelve black oystercatchers and about 10 western gulls were present. The north end of the beach was steeply cut away, the berm held up by a matrix of buried *Arundo donax* sticks from last year. The most interesting find was a dead sea otter. We also found seven dead

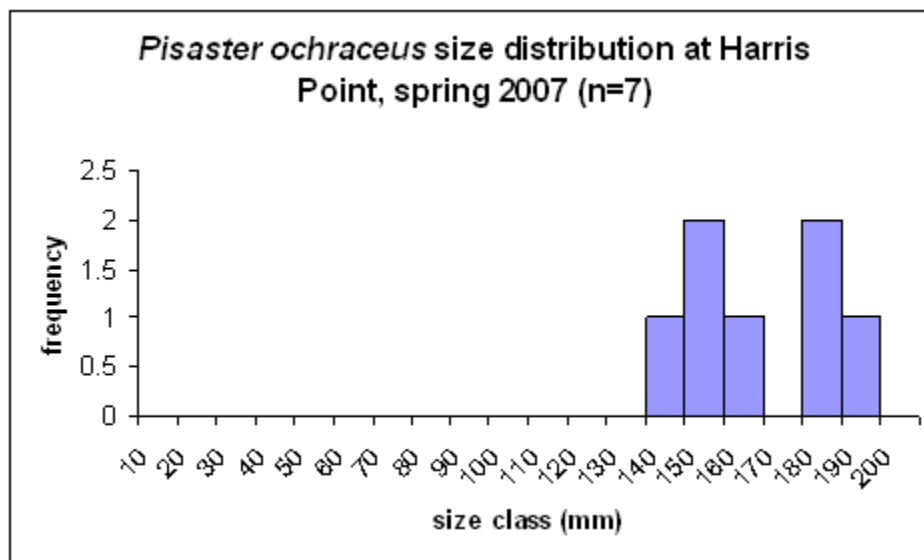
California sea lions, two elephant seal bulls, a pacific loon, two rhinoceros auklets, and a tufted puffin.

Photoplot summary – mean % cover by zone at Harris Point, San Miguel Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	25.0	64.6	0.0	7.6	1.0	0.0	0.0	0.0	0.0	0.0	0.2	1.6
Endocladia	17.6	6.4	0.2	51.2	15.8	0.0	3.0	0.0	0.0	5.8	0.0	0.0
Mussels	31.0	0.6	1.0	6.8	1.6	0.0	34.4	1.0	0.6	22.6	0.4	0.0
Tetraclita	24.0	0.0	11.2	3.2	0.0	0.0	21.2	9.2	0.0	30.2	1.0	0.0
Hesperophycus	19.2	0.2	0.0	32.4	45.2	0.0	0.0	0.2	0.0	2.6	0.2	0.0

Pisaster ochraceus at Harris Point (30-minute count)

count 8
min size 140
max size 190
mean size 165
StDev 17.72811



May 19, Crook Point. Low tide was -1.3 ft. at 0656 hrs. Water temperature was 11.5°C. Dense patchy fog came and went throughout the morning. The wind was high and built to a steady 30 mph by noon. Blowing sand was an issue. There were four elephant seals in the surge channel. Birds included about 30 western gulls, five black oystercatchers, and a wandering tattler.

Porphyra perforata was abundant on the inner reef covering the mussels that fill the rockweed plots. Very little rockweed was present anywhere. There were only a few plants of *Silvetia compressa* and most of the *Hesperophycus* plants (which were the small form) were brown and shriveled. A few small plants of *Analipus japonicus* were found. *Laminaria setchelli* were abundant along the outer edge of the reef. *Mytilus californianus*

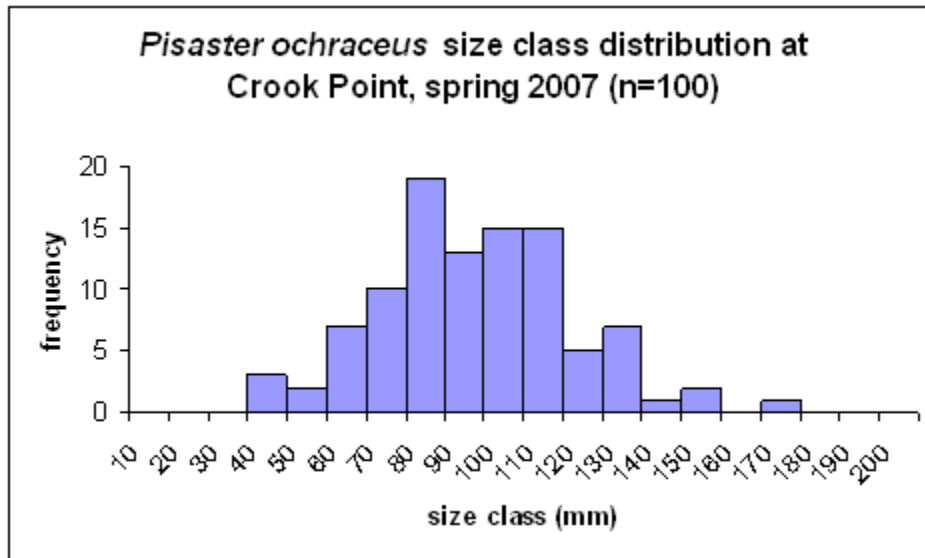
were dense on the inner reef but a little more sparse on the outer reef. Several bald (presumed diseased) *Strongylocentrotus purpuratus* were found. We found 120 *Pisaster ochraceus* (40-170 mm) one *P. giganteus*, one *Patiria miniata*, and 32 black abalone (60-147 mm). Very few motile invertebrates were found in the photoplots except *Littorina* spp. and low numbers of *Nucella emarginata* and *Tegula funebris* in the *Mytilus* zone.

Photoplot summary – mean % cover by zone at Crook Point, San Miguel Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	51.0	44.6	0.0	3.6	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Endocladia	46.4	6.6	0.8	18.4	6.6	0.0	12.4	0.4	0.6	6.8	1.0	0.0
Silvetia	31.0	4.6	0.2	12.0	1.8	0.4	28.4	2.2	1.0	17.8	0.2	0.0
Mussels	15.2	0.4	0.4	0.0	0.0	0.0	77.6	0.0	0.8	5.6	0.0	0.0

Pisaster ochraceus at Crook Point (30-minute count) (only 100 measured)

count	120
min size	40
max size	170
mean size	93
StDev	24.88357

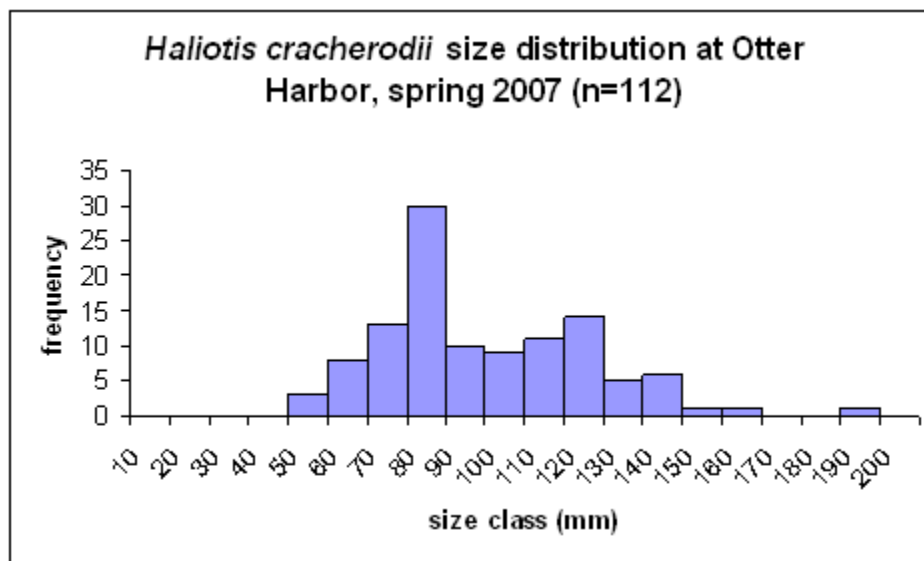


May 20, Otter Harbor. Low tide -0.9 ft. at 0754 hrs. Water temperature was 12°C. Winds were high but not uncomfortable at the site. The sky was clear and swell was moderate. Only a couple of the barnacle plots were still accessible by 1230. There were 11 harbor seals, eight elephant seals, one cormorant, eight gulls, and seven black oystercatchers present. An additional 16 elephant seals were on the beach adjacent to the site. Numerous seals were on the beach further east. Three western gull nests were found in the iceplant on the bluff above the site.

We spent over two hours searching for black abalone, measuring or estimating 129. We found 37 that we could read the tags of. One tag would not respond. Either I could not get the reader close enough or the tag was bad. Two others were too close to another and only one tag could be read for the group. We counted but did not measure seastars as we searched for abalone. Eight *Pisaster giganteus* and 48 *P. ochraceus* were found. Little change from the January sample was seen.

Photoplot summary – mean % cover by zone at Otter Harbor, San Miguel Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	33.2	45.2	0.0	0.0	0.0	0.0	0.0	4.8	0.0	15.2	0.0	1.6
Endocladia	24.6	3.6	0.8	51.2	0.2	5.2	0.8	0.2	0.2	12.6	0.6	0.0
Silvetia	26.8	23.6	0.4	25.2	0.0	8.4	0.0	0.0	0.0	14.4	0.2	1.0
Mussels	29.8	0.0	0.8	0.2	0.0	0.0	47.6	0.0	5.6	14.4	1.6	0.0



May 21, Cuyler Harbor. Low tide -0.5 ft. at 0854 hrs. Dense fog gave us some drizzle in the morning but broke up in the afternoon. Winds were high again. There were two elephant seals swimming by the reef. Four black oystercatchers were present. At one point Ken noticed 18 common raven flying over the east end of the beach. We were on site from 0650-1230 hrs.

The zonal banding of *Balanus*, *Endocladia*, *Hesperophycus*, *Silvetia*, *Tetraclita*, *Mytilus*, *Phragmatopoma*, *Chondracanthus canaliculatus*, *C. spinosus*, *Egregia*, *Prionitis lanceolata*, *Gelidium pupureus*, and *Laminaria setchellii* is always striking at Cuyler Harbor. We found 88 *Pisaster ochraceus* (50-170 mm, most were over 100 mm). *Phragmatopoma californica* reefs were mostly broken and there were no large “sand castles”. No abalone were found. Giant *Mytilus californianus* were present in the mussel plots except plot 401 that had many young recruits.

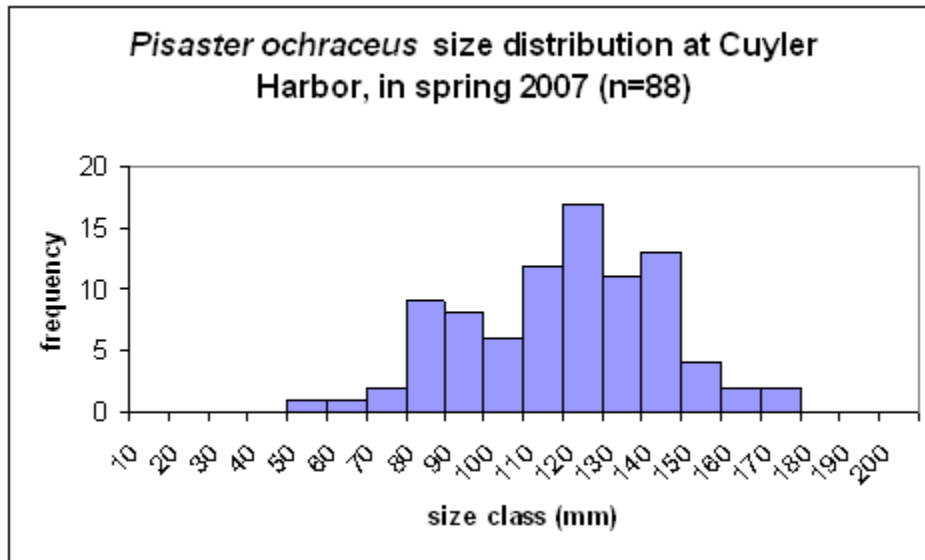
We surveyed Cuyler Harbor Beach finding no snowy plovers. There were carcasses of three California sea lions, a young elephant seal, and a common dolphin on the beach. Numerous western gulls, about 25 brown pelicans, and three black oystercatchers were on the beach. Western grebes and surf scoters were in the harbor.

Photoplot summary – mean % cover by zone at Cuyler Harbor, San Miguel Island, spring 2007 (5 plots/zone):

ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
Chthamalus/Balanus	26.8	39.8	0.0	32.8	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0
Endocladia	25.0	3.2	0.0	38.2	0.0	9.8	10.0	0.6	0.0	12.2	1.0	0.0
Silvetia	12.8	0.0	1.4	2.6	0.0	66.4	0.8	0.4	0.0	12.0	3.6	0.0
Mussels	21.8	0.6	6.6	0.0	0.0	9.2	40.8	2.6	3.2	5.6	9.6	0.0

Pisaster ochraceus at Cuyler Harbor (30-minute count)

count 88
min size 50
max size 170
mean size 115.4545
StDev 25.13911



May 22. We departed San Miguel Island mid-day. The plane dropped me off at Santa Rosa Island to conduct the snowy plover counts on beaches there, then continued to Camarillo with Ken and Kara (see trip report for snowy plovers spring 2007).

Santa Cruz Island June 17-19, 2007

(Database event #2007G)

PURPOSE: Monitor tagged black abalone at Willows Anchorage and collect limpet samples for Fish and Game.

PROCEDURE: We used Island Packers to get to Santa Cruz Island. At Willows we searched for black abalone and read the PIT tags with the Biomark Pocket Reader. Abalone were measured with calipers and the range and bearing to reference bolts was recorded. Nearest neighbor distance was recorded for each abalone. Limpets were collected over a large area for analysis by California Fish and Game. We returned on the park boat.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Ian Taniguchi, Marine Biologist, California Department of Fish & Game

RESULTS:

June 18, Willows Anchorage. Low tide was -0.8 ft. at 0717 hrs. There was a heavy marine layer but the wind was calm and only occasional swells affected the site. WE got wet but it didn't hamper our search very much. There were four black oystercatchers in the area. They were seen chasing a common raven on the islet. We were on site from 0730 to 1030 hrs.

Many *Pisaster ochraceus* were present and most were small (well under 100mm arm length). A few *Aplysia californica* were present and there were several *Megathura crenulata* and *Parastichopus parvumensis* in the shallows.

We recaptured 26 tagged abalone and were able to read 24 of the tags. The other two were in crevices that would not allow the reader close enough access to read the tag. I used aluminum foil to cover one tag when two tagged abalone were next to each other, a problem we had in the past when we were unable to read more than one tag or discern which abalone we were reading. Another 44 black abalone without tags were found. One red abalone (47 mm) was found.

After searching the reef we, we tagged four of the untagged abalone that were easily accessible. The tide came in fast so were not able to tag more. We did check the west side of the reef and found three tagged abalone there. Of the 70 abalone found, 54 were within 50 cm of another abalone.

In the afternoon we walked Christy beach where we only found a dead pelican and a portion of meat and blubber from a marine mammal that gulls were feeding on. There were six killdeer near the mouth of the creek and we saw a young adult bald eagle fly over. We collected at least eight balloons but there was little other debris on the beach.

June 19, Prisoner's Harbor. Low tide was -0.3 ft. at 0802 hrs. The marine layer burned off early. We decided to collect among the rocks to the east of the pier. There were five black oystercatchers present.

We collected samples of *Lottia scabra*, *L. digitalis* and *L. paradigitalis*. Ian sent them off to Jim Moore, CDFG histologist who will look for RLP among them. RLP is the disease pathogen that causes Withering Syndrome among the black abalone and he is trying to see if the pathogen is harbored in the limpets.

We observed at least four bat rays from the pier while waiting for the boat.

Santa Cruz Island September 26-29, 2007

(Database event #2007H)

PURPOSE: Monitor tagged black abalone at Willows Anchorage.

PROCEDURE: We used Island Packers to get to Santa Cruz Island. At Willows we searched for black abalone, *Haliotis cracherodii*, and read the PIT tags with the Biomark Pocket Reader. Abalone were measured with calipers and the range and bearing to reference bolts was recorded. Nearest neighbor distance was recorded for each abalone. We returned to Ventura on Island Packers.

SUMMARY: we found 169 black abalone at Willows Anchorage including 17 that were tagged. The mean size was 59 mm. That translates to a density of approximately 0.07 m^{-2} . A total of 29 black abalone were found at Valley Anchorage during a brief survey there. A total of 470 *Pisaster ochraceus* were found on the inner reef during abalone sampling. 242 of those were measured with a mean of 58 mm. The ratio of *Tegula funebris* to *T. gallina* was 86:80

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Susie Tharratt, Bio-tech, Channel Islands National Park

RESULTS:

26 September. The weather was very pleasant but there was a moderate south swell. We went down to Valley anchorage just to take a quick look around. We were in the intertidal from about 1300-1500 hrs. The low tide was +0.2 ft. at 1604 hrs. On the main reef we counted seastars and abalone finding 39 *Pisaster ochraceus* and eight black abalone. The abalone ranged from 32-70 mm. One was by itself near the NE point of the rock the others were in two groups near the beach access (northwest corner?). The tidepools had a couple of juvenile zebra perch (*Hermosilla azurea*) as well as juvenile opaleye and sculpins. We also searched the boulder area to the northeast and found 21 black abalone ranging from about 40-110 mm.

27 September. Low tide -0.2 ft. at 1650 hrs. Water temperature 18°C. The weather was calm and very pleasant. The swell had lain down but there were still occasional sets washing the reef. One common raven was present on the reef and two black oystercatchers were at Ship Rock. Because of the tide and surf we were not able to really begin searching until 1330 hrs. We checked the beach while waiting and found moderate numbers of *Emerita analoga* and a few *Alloniscus* sp. It was after 1700 hrs. when we finished the inner reef, stopping at the cobble-filled crack just west of the Endocladia plots, and called it a day. We slowly worked the inner reef checking in all rock crevices for abalone. We also counted seastars, measuring all that were easily measurable on the inner reef. We measured 242 *Pisaster ochraceus* and counted an additional 228. The majority, by far, was under 45 mm radius, though we did find adults as large as 140 mm. We also checked turban snails to compare the ratio of the two species finding a total of 86 *T. funebris* and 80 *T. gallina*. We noted that *Phragmatopoma californica* “sand castles” were developing nicely around boulders in the inshore area of the reef.

We found 68 black abalone ranging in size from 21-129 mm. Most were in the 30-60 mm range and most were less than 10 cm from their nearest neighbor. We relocated and read 15 tags among the abalone. Purple sea urchins, *Strongylocentrotus purpuratus*, were abundant and seemed more common than last June. They were numerous in the crevices just below the Pe5 plot where we found abalone last spring but not this time. The area of the inner reef (measured using Google Earth) is approximately 1059 m². There the outer reef is approximately 1331 m².

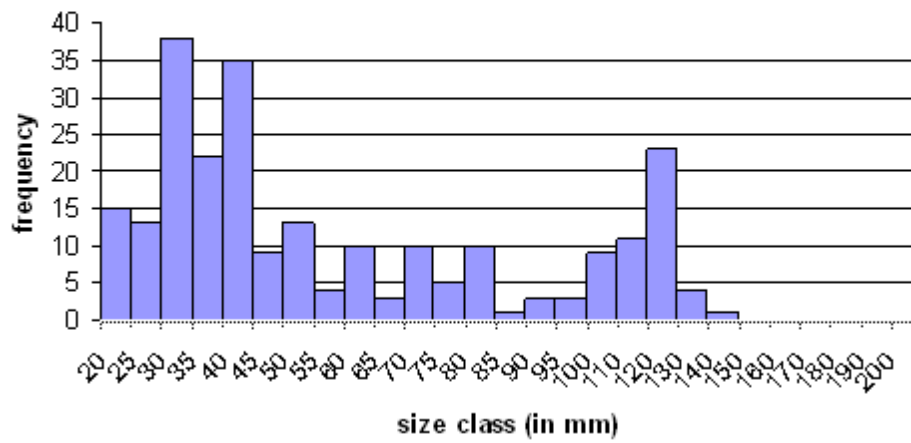
I gave a brief talk on our work to 25 middle school students from the Oak Grove school who were working on a project with Channel Islands Restoration.

28 September. Low tide -0.3 ft. at 1739 hrs. Excellent weather again and light swell. We worked at the outer reef, mostly west of plot L5 from about 1400-1730 hrs. then checked the inner reef briefly. There were two black oystercatchers in the area.

We found one black abalone near plot M3 and all the rest were west of L5. We found a total of 101 abalone, but only two tags. Sizes ranged from 21-95 mm. We noted that most were on crustose coralline covered rock on the inshore facing wall of crevices. A few were underneath boulders but most were semi-exposed in small crevices within larger crevices. We observed a couple abalone moving. One was moving up a rock and settled into a crevice. Another disappeared within 5-10 minutes after being measured and it must have moved under a boulder as I couldn't find it. We also noted that one or two *Pisaster* disappeared during the day, even though they had not been touched. We checked on some of the abalone measured on 9/29 and found most still in approximately the same location but a few had moved. In particular two tagged abalone below plot Pe2 were gone and three from the large point (below the BLM transect) were gone from the crevice.

29 September. Returned to Ventura on Island Packers.

Pisaster ochraceus size distribution at Willows
Anchorage (SCI), September 2007 (n=242)



Fall 2007 Rocky Intertidal Monitoring Trip Reports

Santa Barbara Island October 24-28, 2007

(Database event #2007-I)

PURPOSE: To monitor rocky intertidal sites at Santa Barbara Island.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Ken Niessen, volunteer
Connie Jenkins, volunteer
Laurie Harvey, Seabird Ecologist, Channel Islands National Park
Kevin Barnes, SCA seabird intern

PROCEDURE and general observations: We were transported to the island on the Sea Ranger II, with glassy conditions the entire way out. Laurie and Kevin were continuing with work on the greenhouse and plantings. Connie and Ken were helping me with intertidal monitoring and with the plant work as available.

October 24, Landing Cove. Low tide -0.1 ft. at 1448hrs. The sky was clear except for all the smoke from the Malibu and other southern California fires fanned by the intense offshore winds of the last three days. Today was calm but there was a moderate south swell. There were 12 young California sea lions in the cove. Two black turnstones were seen when we arrived at noon. Two black oystercatchers were seen in the evening from up on top of the island. Five western meadow larks were in the intertidal this afternoon.

We shot all the photos, easily finding all the plots including three corners of plot 326 (we haven't been able to locate corner bolts in some time. I scored motile invertebrates in the barnacle zone plots finding mostly Littorines, with a few limpets, *Ocenebra circumtexta*, and low numbers of chitons. There were quite a few *Mytilus californianus* in the barnacle plots. *Endarachne binghamiae* was common. *Endocladia muricata* was rare.

We spent the rest of the day helping Laurie and Kevin with the greenhouse plants.

October 25, Landing Cove. Low tide -0.7 ft. at 1533 hrs. We spent the morning helping with planting *Sueda* above Landing Cove. We were on site at the Landing Cove from 1300-1800 hrs. there was still a persistent swell but it was down a little from yesterday. I tried the north side but decided the crossing is too dangerous as the footing is really loose. Three black turnstones were foraging on the north reef. Two black oystercatchers were seen down by middle canyon but not in the cove.

I scored the barnacle plots then counted motile invertebrates in the mussel plots. Ken counted seastars in a 30-minute search finding 379 *Pisaster ochraceus*. He measured over 100 after the count with the mode being about 70 mm. We spotted one black abalone (84 mm) just a meter away from plot 326. The seastar (18x2m) transect between plot 327

and 329 had 44 on the offshore side and 25 on the inshore side. Ken was knocked down by surge and cut up both knees. We all got wet at various times.

I then collected about forty each of *Lottia scabra*, *L. digitalis*, *Tetraclita rubescens*, and *Pollicipes polymerus* for genetic samples for Mike Dawson et al. I also collected fronds of *Silvetia compressa* and *Chondracanthus canaliculatus*. The collecting was much more difficult and time consuming than it might seem. Much of the difficulty was that *L. digitalis* were not common and often had odd forms.

October 26, Sea Lion Rookery. Low tide -1.0 ft. at 1620 hrs. After catching up on notes and making sure yesterday's collections were drying properly, we went to a Pleistocene marine layer near the mouth of Graveyard Canyon to collect shell samples for Dr. Dan Muhs. We didn't find any cup corals that he most wanted but we did find a variety of limpets, *Conus*, *Tegula*, *Serpulorbis*, and other shells. The shells were in a gravely sand deposit that was surprisingly hard. The layer above the marine shells was full of land snails as described by the Los Angeles County Museum collection from the 1970s. The area we went to was near the mouth of a gully and was relatively easy to get to but tricky to get back up onto the terrace. There were about 60 sea lions in the area. After lunch we moved to the Sea Lion Rookery site to begin the intertidal monitoring.

Because the day was cool and mostly overcast, there were a lot of sea lions still up on the haul out up the hill. I estimated about 300 sea lions in the area. The swell was light and not an issue at all. Overall we had very good working conditions. There were four black turnstones, one black oystercatcher and six western gulls at the site. There were 30-40 gulls on the reef to the south late in the day. We were on site from about 1300 to 1830 hrs.

After shooting all the photos I counted the motile invertebrates with Connie recording while Ken counted *Pisaster ochraceus* finding 716 in a 30-minute search. This was a huge increase over previous years. There were many small patches of open rock among the mussel bed with dense clusters of sea stars. After counting Ken measured 123 *P. ochraceus* for size frequency. The mode was at 80 mm. I measured *Lottia gigantea* for size frequency over a random area since we do not have established plots. Ken did most of the specimen collection of *Tetraclita*, *Pollicipes*, *Lottia scabra*, *Silvetia*, and *Chondracanthus*. I looked for *Lottia digitalis* and was only able to find six individuals.

As usual several of the *Silvetia* plots were challenging to find but we did manage to find all the corners except the lower corners of plot 334. All the upper plots were fine except for a couple of minor missing corners. There wasn't time for making repairs but there were no critical missing corners. We were unable to find any of the bolts for mussel plots 350, 351 or 353 most likely because of overgrowth as the bed is several inches thick with large and small mussels. I shot the photos and did motile invertebrate counts where I thought the plots were located. Plot 351 should be right on because there is a tell-tale ridge next to the plot, the others may not be as precise. The cover in the area was fairly uniform except for some bare patches next to 350, however if the plot overlapped those patches we should have found the corners bolts.

The *Balanus/Chthamalus* and *Endocladia* plots were dominated by *Ulva* sp. which was short and often flattened by the Sea Lions that had been laying on it. Except for a relatively low number of *Littorina* spp., there were few motile invertebrates in those plots, found only in the small crevices in the rock. *Endocladia* was quite rare and very small when present. *Endocladia* plot 337 is vertical and thus not subject to trampling and had significantly more kinds of algae, with *Mazzaella affinis* being one of the dominants. Surprisingly there were not many more invertebrates than the horizontal plots, but the plot may still receive runoff of the sea lion scat and urine on the reef that may have an impact on some invertebrates. *Chthamalus* was present but rare in the plots. *Tetraclita rubescens* was more common in many of the upper zone plots.

Silvetia compressa looked healthy and had moderate cover in all *Silvetia* zone plots except 330 which was dominated by large *Tetraclita*, *Mytilus*, and *Lottia gigantea*. *Mytilus californianus* cover was high in all mussel zone plots. *Tetraclita* and *Endarachne* were growing on the shells of many mussels. A few *Pollicipes polymerus* were in the matrix. The beds were quite thick so the motile invertebrates were probably much higher than what I was able to find on the surface.

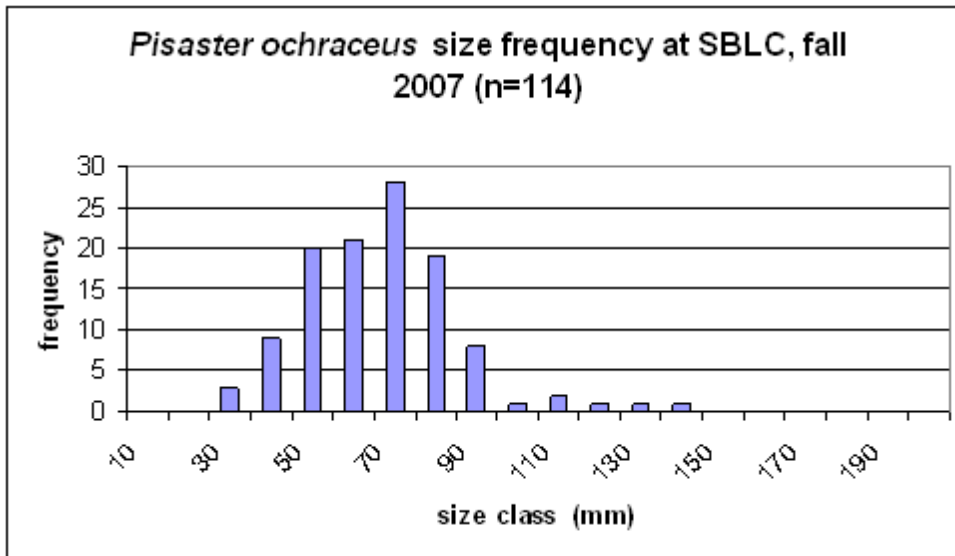
As at Landing Cove, *Ocenebra circumtexta* were the only predatory snails found except for a few *Ceratostoma nuttalli*.

October 27, Landing Cove. Low tide -1.1 ft. at 1711 hrs. Rain this morning. After catching up on notes and photo-downloads, we hiked the northern half of the island shooting the fall island photopoints. There was one black turnstone and two black oystercatchers in the Landing Cove area this afternoon. The swell was down and there were 45 young Sea Lions in the cove. We were onsite from 1400-1700 hrs.

The surge channel crossing was very loose and felt dangerous the other day so we used the skiff to paddle over to the north reef. In anything other than calm seas this would be pretty difficult also because of the way swells roll over the surf and pull everything back on the backwash.

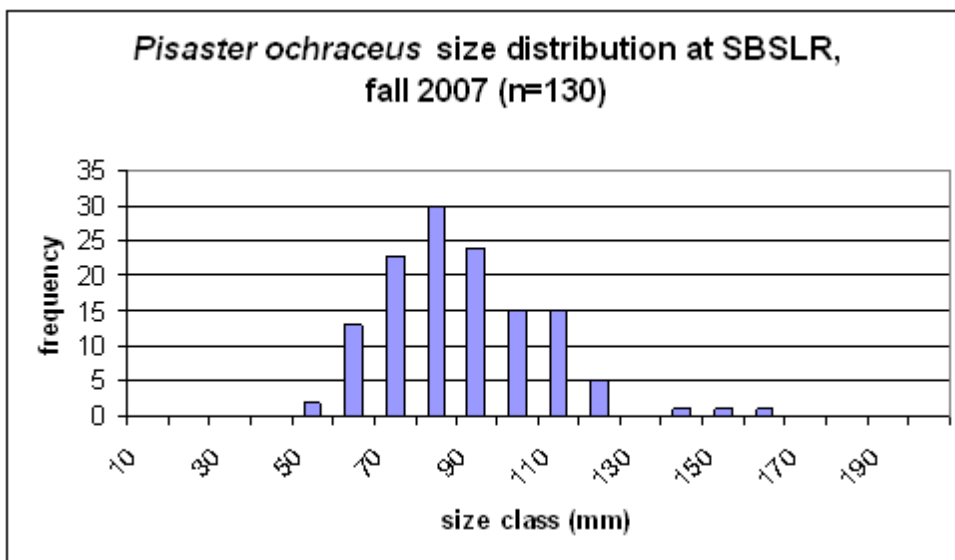
I counted motile invertebrates and scored all ten plots then collected ten more *Silvetia* blades and six more *Chondracanthus* blades.

October 28, Low tide -0.9 ft. at 1707 hrs. Shot remaining photopoints near badlands, cleaned, packed, and departed the island on the M/V Retriever at 1100 hrs.



Pisaster ochraceus size distribution at SBLC

count	114
min size	30
max size	140
mean size	66.84211
StDev	19.29353



Pisaster ochraceus size distribution at SBSLR

count	130
min size	50
max size	160
mean size	86.53846
StDev	19.39838

Photoplot summary – mean % cover by zone at Landing Cove, Santa Barbara Island, fall 2007 (5 plots/zone):

Site	ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turf-weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar	Phyllo-spadix
LC	Chthamalus-Balanus	54.0	6.2	9.4	2.6	0.0	0.0	12.6	3.2	0.2	10.6	1.2	0.0	0.0
LC	Silvetia	27.2	0.4	0.4	0.0	0.0	3.0	1.0	16.0	0.0	52.0	0.0	0.0	0.0
LC	Mussels	14.8	0.0	0.8	0.0	0.0	0.0	66.0	0.0	0.4	14.6	3.4	0.0	0.0
LC	Gelidium-Pterocladia	0.0	0.0	0.0	0.0	0.0	0.0	5.4	40.0	0.0	22.8	0.6	0.0	31.2

Photoplot summary – mean % cover by zone at Sea Lion Rookery, Santa Barbara Island, fall 2007 (5 plots/zone):

Site	ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hespero-phycus	Silvetia	Mussels	Turf-weed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
SLR	Chthamalus-Balanus	63.8	4.4	0.8	0.0	0.0	0.0	0.6	0.0	0.0	30.4	0.0	0.0
SLR	Silvetia	26.2	1.4	6.4	1.8	0.0	0.0	3.8	0.0	0.6	59.6	0.2	0.0
SLR	Mussels	21.2	0.0	3.6	0.6	0.0	20.4	5.6	7.2	0.0	41.0	0.4	0.0
SLR	Gelidium-Pterocladia	0.6	0.0	0.4	0.0	0.0	0.0	94.0	0.0	0.4	3.2	1.4	0.0

Lottia gigantea measurements at Santa Barbara Island. Data are from random measurements from site area

SiteCode	CountRandom	CountSized	MeanSize	StDev	MinSize	MaxSize
SLR	156	156	41.71	9.57	15	66

SiteCode	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm
SLR	0.64%	10.90%	27.56%	41.03%	16.67%	3.21%

Anacapa Island December 20-22, 2007

(Database event #2007-J)

PURPOSE: To monitor rocky intertidal sites at Anacapa Island.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Mike Moss, biotech, Channel Islands National Park
Alli Craig, SCA intern CINP
Danielle Lipski, Channel Islands National Marine Sanctuary
Julia Vo, UC Merced
Terrance Shinn, CINMS
Charlie Lara, CINMS
Briana Jones, Oxnard College
Briana Saylor, Oxnard College

PROCEDURE and general observations: The R/V shearwater provided transportation to the island. Standard procedures were followed for photographing and counting motile invertebrates in fixed plots. Percent cover was determined from the digital images. Black abalone, *Haliotis cracherodii*, and seastars were counted in 30-minute searches and measured for size distribution. Owl limpets, *Lottia gigantea*, were measured in fixed one-meter radius plots. The highest number of shorebirds and pinnipeds was recorded. Julia collected samples of *Lottia scabra*, *L. digitalis*, *Nucella* spp., *Tetraclita rubescens*, *Pollicipes polymerus*, *Silvetia compressa*, *Mastocarpus papillatus*, and *Chondracanthus canaliculatus* for genetic analysis. Terrance and Charlie operated the Shearwater. Both Brianas were on the Shearwater as observers on 12/22 and helped us out some in the intertidal.

December 20, Middle Anacapa Island. Low tide -0.4 ft. at 1315 hrs. The sky was overcast and we had light rain for an hour or so. The area received approximately two inches of rain this week. We had excellent conditions overall with very little wind or swell. There was a pair of California sea lions swimming by and barking at us. One harbor seal was spying on us from the water. Two black oystercatchers were on the reef nearby. We worked the site from 1000-1500 hrs.

I got Mike started on counting motile invertebrates with Dani recording for him, and sent Julia off to the east of the site. I shot the photos with Alli recording for me. Allie and I then did a thirty-minute search finding 17 black abalone (35-115 mm). Nearest neighbor distances were also recorded. I later measured an additional 10 abalone that I found collecting *Nucella* for Julia. Alli counted seastars for thirty minutes finding 521 *Pisaster ochraceus* and one *P. giganteus*. She then measured 112 *P. ochraceus*. (50-180 mm). *Tegula* spp. were fairly common and I recorded species finding a ratio of *T. gallina* to *T. funebris* of 80:26. *Caulacanthus ustulatus*, though not very common yet, has spread from last year. At this time of year, the mats of *C. ustulatus* are very non-remarkable and are easy to miss.

After finishing at Middle West, I had Charlie drop me off at Middle East reef to photograph the plots. *Caulacanthus ustulatus* was still present right around and in plot 53. It grows primarily on the mussel shells there and does not seem to have spread. I did not visit Harbor Seal Arch mostly

because the tide seemed to be covering much of the reef over there by the time Charlie picked us up.

Nucella emarginata were quite common and many large individuals were found (15-26 mm in motile invertebrate counts. Some had taller more elongated spires that look like *N. canaliculata*. Most were found along the upper *Mytilus* zone where we found the abalone.

Ocenebra circumtexta were not common. *Acanthina* sp. were fairly common. *Ceratostoma nuttalli* were present. *Pachygrapsus crassipes* were common and a variety of sizes were observed. Cottids and juvenile *Girella nigricans* were common in pools. *Lottia gigantea* were common. *Strongylocentrotus purpuratus* were common to abundant below the zero tide line.

December 21, 2007, South Frenchy's Cove and Cat Rock. Low tide -1.0 ft. at 1400 hrs. We had excellent conditions with partly cloudy sky, light breeze, light swell and pleasant temperature. The water temperature was 13.5 C. In the South Frenchy's Cove area there were two black oystercatchers. Near Cat Rock there were four black oystercatchers and two American oystercatchers, as well one western gull. On the beach at north Frenchy's there were two rhinoceros auklet carcasses and one dead sea lion. One of the auklets was very fresh so I collected it for the museum. The other auklet was partially scavenged and partially oiled. There were at least two dozen trap floats in the vicinity of Cat Rock and several of the floats were practically in the intertidal at low tide, apparently fishing in the surfgrass zone now that the 20 closure is no longer in effect there.

Mike and Dani counted motile invertebrates in the photo plots and later searched for abalone and seastars in 30 minute searches. They also measured *Lottia gigantea* in the fixed plots. Julia collected specimens near the Frenchy's site for genetics. After photographing the plots Alli and I walked to Cat Rock to photograph the plots there. We also did a 30-minute seastar and abalone search. Mike and Dani walked to Cat Rock and helped with the owl limpet plots there.

At Frenchy's there were 16 *Pisaster ochraceus* were found, no abalone. At Cat Rock we found seven *P. ochraceus* two *P. giganteus* and three *Haliotis cracherodii*. All the abalone plots at Cat Rock were vacant. At total of 19 *Lottia gigantea* were in plots at Frenchy's. Cat Rock had 67 *L. gigantea* in the three plots.

Small *Ligia occidentalis* were abundant among the boulders between Cat Rock and Frenchy's. Near the blowhole reef, there was a small red turf alga on some of the boulders that appears to be *Caulacanthus ustulatus*. *Tegula gallina* were abundant especially in the pool near bolt OT2. We found the ration of *T. gallina* to *T. funebris* to be 127:10.

The sand level at Frenchy's was quite high. The corner of plot 155 was only 25 cm above the sand. There was no surfgrass in the surge channel at the site. *Gracilaria* sp. and some *Prionitis lanceolata* were the only algae there. I installed a Tidbit temperature logger with epoxy to the rock in a crevice near Lottia plot 3. Tar was uncommon at both sites but weathered tar was all over rocks in the gap between the islets.

I repaired plot corners. Many were missing the number tag or the tags had become unreadable. Plot corners at Frenchy's were in pretty good shape.

December 22, 2007, Orizaba Cove, Santa Cruz Island. Low tide -1.4 ft. at 1445. We had excellent conditions again with sunny sky, moderate swell, no wind and pleasant temperature. Water temperature was 13 C. There were three harbor seals in the cove when we arrived. Two black oystercatchers were on Orizaba Rock and there were about ten brown pelicans on the rock.

We photographed plots then Dani counted *Pisaster* finding 537 *P. ochraceus* in a 30 minute search and measured 125 after the timed search. We all searched for black abalone finding a total of 16 with sizes ranging from 26-115 mm. We also did a ratio of *Tegula* species identifying all that we found in an area. *T. funebris* was much more common here than at Anacapa and the *T. gallina* to *T. funebris* ratio was 20:91.

Balanus glandula were huge and very dense in areas. *Tetraclita rubescens* were very large and seemed to be doing well, but several of the plots were dominated by *Mytilus californianus*. There was good growth of both *Hesperophycus* and *Silvetia*. There were several large bare patches in the mussel bed that were probably torn out in the swell two weeks ago. The bed here was very deep in places. *Pisaster ochraceus* were abundant too and were often in high numbers in the bare patches so they may have either undermined those places or quickly moved in when the mussels were lost. Only diatoms were growing on the rocks and byssal threads were still present.

We departed Orizaba about 1400 hrs. and went to **Harbor Seal Arch at Middle Anacapa** to do an abalone search there. All five of us searched for 30-minutes and found 11, ranging from 50 to 127 mm. Mid to large sized *P. ochraceus* were abundant. Most of the abalone were found in small crevices among the *Mytilus californianus* usually near the upper part of their zone. *Phragmatopoma californica*, *Serpulorbis squamigerous* and *Tetraclita rubescens* were abundant in some of the fixed abalone plots which were all vacant of abalone.

We departed Anacapa at 1600 returning to Ventura about 1700.

Lottia gigantea measurements at Anacapa. Data are for three plots pooled from each site.

SiteCode	CountDensity	Area	Density	CountSized	MeanSize	StDev	MinSize	MaxSize
CR	65	9.42	6.898	65	35.78	9.86	18	58
SFC	19	9.42	2.016	19	43.00	9.59	28	58

SiteCode	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm
CR	3.08%	26.15%	43.08%	12.31%	15.38%
SFC	0.00%	10.53%	36.84%	21.05%	31.58%

Photoplot summary – mean % cover by zone at Anacapa Island, fall 2007 (5 plots/zone):

<i>Site</i>	<i>ZoneName</i>	<i>Bare Rock</i>	<i>Barnacle</i>	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hesperophycus</i>	<i>Silvetia</i>	<i>Mussels</i>	<i>Turfweed</i>	<i>Leaf Barnacle</i>	<i>Misc Algae</i>	<i>Misc Animal</i>
CR	Chthamalus/Balanus	39.4	48.2	0.0	4.3	7.2	0.2	0.0	0.0	0.0	0.4	0.1
CR	Endocladia	30.3	5.0	7.2	26.9	0.2	1.6	7.0	5.2	0.1	15.7	0.8
CR	Silvetia (Rockweed)	29.9	17.1	0.4	6.8	8.3	31.7	2.1	0.1	0.0	3.4	0.1
CR	Mussels	21.1	1.2	12.3	1.3	0.0	0.0	46.0	0.9	0.0	17.0	0.1
ME	Chthamalus/Balanus	66.3	3.0	10.0	6.3	0.0	0.0	3.7	0.0	0.0	8.3	2.3
ME	Endocladia	49.0	4.7	6.7	14.7	0.0	0.3	5.0	0.0	0.0	19.3	0.3
ME	Silvetia (Rockweed)	23.3	2.0	7.7	0.3	0.7	38.3	1.3	0.0	0.0	26.0	0.3
ME	Mussels	5.7	0.7	3.0	0.0	0.0	0.0	61.0	0.0	0.0	28.7	1.0
MW	Chthamalus/Balanus	53.4	14.2	0.0	12.0	0.0	0.0	2.0	0.2	0.0	18.0	0.2
MW	Endocladia	47.6	3.0	0.4	16.6	0.0	0.0	14.2	0.4	0.0	17.6	0.2
MW	Silvetia (Rockweed)	33.4	0.8	0.8	6.2	0.0	25.6	8.0	3.6	0.0	21.0	0.6
MW	Mussels	15.2	0.0	2.6	0.0	0.0	0.0	66.4	0.6	0.2	13.4	1.6
SFC	Chthamalus/Balanus	29.8	59.6	0.0	4.0	2.2	0.0	0.0	0.0	0.0	4.2	0.2
SFC	Endocladia	15.8	1.4	0.0	65.0	1.2	14.8	0.0	0.0	0.0	1.8	0.0
SFC	Silvetia (Rockweed)	16.2	5.4	0.0	6.2	0.0	50.8	0.0	0.0	0.0	21.4	0.0
SFC	Mussels	6.2	0.0	0.2	0.0	0.0	0.0	67.2	8.6	0.0	17.6	0.2

**Photoplot summary – mean % cover by zone at Orizaba Cove, Santa Cruz Island, fall 2007
(5 plots/zone):**

<i>Site</i>	<i>ZoneName</i>	<i>Bare Rock</i>	<i>Barnacle</i>	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hesperophycus</i>	<i>Silvetia</i>	<i>Mussels</i>	<i>Turfweed</i>	<i>Leaf Barnacle</i>	<i>Misc Algae</i>	<i>Misc Animal</i>
OC	Chthamalus/Balanus	26.6	61.2	2.8	0.2	0.0	0.0	3.4	0.0	0.0	5.8	0.0
OC	Silvetia (Rockweed)	13.4	0.0	5.2	3.4	10.0	36.6	13.8	0.0	0.0	17.6	0.0
OC	Mussels	16.4	0.4	0.2	0.0	0.0	0.0	37.0	0.0	0.0	35.2	10.8
OC	Tetraclita	8.4	0.4	12.8	0.0	0.0	0.2	71.6	0.0	0.2	6.0	0.4
OC	Hesperophycus	12.2	13.6	0.6	16.2	28.8	4.8	12.6	0.0	0.0	11.2	0.0

Santa Rosa Island January 2-12, 2008

(Database event #2007-K)

PURPOSE: To monitor rocky intertidal sites at Santa Rosa Island.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Mike Moss, biotech, Channel Islands National Park
Julia Vo, UC Merced
Harold Neufeldt, volunteer

PROCEDURE and general observations: Regular transportation on the Ocean Ranger was taken to the island. Standard procedures were followed for photographing fixed plots. Percent cover was determined from the digital images. Black abalone, *Haliotis cracherodii*, and seastars were counted in 30-minute searches and measured for size distribution. Owl limpets, *Lottia gigantea*, were measured in fixed one-meter radius plots. Fixed 10-meter surfgrass point intercept transects were read at East Point. The greatest number of shorebirds and pinnipeds was recorded. Julia collected samples of *Lottia scabra*, *L. digitalis*, *Nucella* spp., *Tetracrita rubescens*, *Pollicipes polymerus*, *Silvetia compressa*, *Mastocarpus papillatus*, and *Chondracanthus canaliculatus* for genetic analysis for a CEQI grant with several University of California researchers. We never made it to the west end sites, halted by wet roads until late in the tour when the tides were no longer workable.

January 2, Arlington Beach. Low tide 0.7 ft. at 1302 hrs. We went to Arlington Beach to check on the wreck of the Alegria, a lobster boat that went ashore on December 19 or 20. The boat was on the beach near the mouth of the creek. The mouth of the creek was closed and the lagoon was fairly large. Debris, including life preservers, presumably from the wreck was washed well up the creek, presumably during the last high tide series. There was some debris on the beach including plastic pieces, fiberglass fragments, sorbent pads, life jackets, and some fishing tackle. Two large batteries had been hauled up the beach and covered with a plastic sheet. The boat holds were all missing covers, one was filled with water the other was nearly full of sand. The only loose items on board that we saw were a tackle box, a small shovel and two cans of pineapple. The windows were broken, the chair was missing, but a small fathometer or similar device was present but apparently damaged. There was a large hole in the hull in the forward port quarter. There were a couple of pieces of wood down the beach that appeared to be pieces of keel from the boat. There were no apparent fluids leaking from the boat at this point.

An immature bald eagle flew off the beach when we arrived. The only other animal seen on the beach was a male elephant seal. Surfgrass wrack was common on the beach but much less than we have seen in the past. There was some fresh oil on the beach but probably only one or two pancakes for 10 meters. The usual debris was present; mostly lobster traps and floats, a few plastic bottles, some toys and straws, and bait cups.

We checked Tecalote Beach from the bluff. About 100 mallards flew off from the lagoon when we arrived and two adult bald eagles were flying along the hills.

An Osprey was perched on the TV aerial of the ranch bunkhouse when we arrived on the island and was later seen flying over the pier.

January 3, Johnson's Lee. Low tide 0.2 ft. at 1343 hrs. Rain was predicted so we did not go to the west end sites at all. The sky was cloudy all day but we did not get any rain. Wind was light and seas were calm giving us excellent conditions even with the plus tide. The sand was fairly high filling much of the tidepool. Four elephant seals were present. One harbor seal was offshore. Two bald eagles flew over shortly after we arrived and there were two western gulls and four black oystercatchers at the site. The water temperature was 14.5 C. We were on site from 1000 to 1400 hours.

Mike helped Julia with collection of genetic specimens of *Lottia scabra*, *L. digitalis*, *Nucella* spp. *Tetraclita rubescens*, *Pollicipes polymerus*, and *Chondracanthus canaliculatus*. Mike also counted seastars and abalone in 30 minute searches and measured. Six *Haliotis cracherodii* were found including the large abalone still in approximately the same location as in the past. All were large. Mike counted 291 *Pisaster ochraceus* in 30 minutes. Sizes ranged from 22- 145mm. I only found 23 *P. ochraceus* in the 10x2 m transect. I measured *Lottia gigantea* in one-meter plots, finding 78 total. Plots 4 and 5 both had numerous individuals under 30 mm. There were none in the plot 1 which was buried under sand last year but there was one just outside the plot. I scored the *Mytilus* zone plots in the field because of the diversity of organisms present and difficulty identifying some of these species in the photos. I installed a Tidbit temperature logger on the wall overhanging abalone plot 517.

Mytilus californianus were common but none were present in four of the *Mytilus* zone plots. Both *Balanus glandula* and *Chthamalus fissus/dalli* were common with patches of dense recruitment. *Endocladia muricata* seemed patchy but there were new plants on plot corners and the color was dark and healthy. *Pollicipes* were common among the *Mytilus*. *Phragmatopoma californica* and *Anthopleura sola* were abundant dominating the lower shelf. Patches of *Anthopleura elegantissima* were more apparent than I recalled from our last visit. The only bleached algae I noticed were some clumps of *Prionitis lanceolata*. I did not record a ratio of the *Tegula* species but what I saw all appeared to be *T. funebris*.

January 3, Ford Point. Low tide 0.2 ft. at 1343 hrs. After leaving Johnson's Lee we went straight to Ford Point figuring we may not get out again because of the rain predicted. Conditions were the same as at Johnson's Lee but the swell was increasing a little and we were racing the incoming tide. One western gull and two black oystercatchers were present. We were on site from 1430 to 1615 hours.

Julia helped with recording. Mike counted seven black abalone and 614 *Pisaster ochraceus* in a 30 minute search. I found a total of 38 *Lottia gigantea* in the fixed plots. None were present in plot 2. Several small *L. gigantea* were present in plots 4 and 5.

Chthamalus and *Balanus* were both abundant in patches. *Mytilus californianus* was common but seemed less common overall than in recent years. *Phragmatopoma* was abundant on the lower

reef. *Nucella* sp. were abundant. *Cylindrocarpus rugosum* was abundant, covering the tops of rocks in several areas.

January 5, East Point. Low tide -0.4 ft. at 1451 hrs. Over two inches of rain fell on Jan 4, closing the roads. We hiked to East Point. Cloudy sky with occasional rain squall. Winds were light but there was heavy surf wrapping around from the west. Water temperature was 14.5 C. When we arrived at the site there were about 20 pelicans, 40 cormorants, and 200 gulls. Four black oystercatchers were around the site. We were on site from 1200-1500 hours.

Because of the high surf the surfgrass plots were never exposed long enough to be surveyed. Mike counted 347 *Pisaster ochraceus* and one *P. gigantea* and six *Haliotis cracherodii*. We did a *Tegula* species ratio but only found 1 *T. Gallina* of over 140 checked. Rockweeds looked healthy though the *Silvetia compressa* was not very dense and all of the *Silvetia* plots had gaps in cover. *Hesperophycus californicus* was robust with especially wide blades, and young plants were common. *Nucella emarginata* and *Acanthina* sp. were both common. Both species of *Phyllospadix* were present but overall the grass seemed thin. Approximately 10% of the grass was bleached and there seemed to be a lot of abrasion. The transects probably still have a fairly high cover but the depth of the layers is not there.

The osprey was seen at Southeast Anchorage and at Old Ranch House Lagoon. We did not see any waterfowl on the lagoons. There were only a dozen or so harbor seals braving the surge at Abalone Rocks where the surf seemed to be focused.

January 6. Another half inch of rain fell. **Jan 7.** High winds. I worked on reports and we all helped at the plant nursery.

January 8, Skunk Point snowy plover count. Low tide -0.9 ft. at 1622 hrs. Mostly cloudy and cold. Light SW wind. Sarah Chaney helped me with the count. We had a lot of logistical things to help with this morning as it was transportation day. We had to walk from Water Canyon because the road was still wet. (On the evening of the 8th we got an additional .02 inches of rain).

We saw a bald eagle adult over SE Anchorage. We also saw a harrier. We started at SE Anchorage at 1100 hrs. Lots of surf scoters and a couple loons off the beach there, 2 black oystercatchers on the beach. Moderate surf today and high tide when we started. On Skunk Point north, there was a large overwash lagoon. This narrowed the area to walk but presented a challenge as the birds were feeding on the lagoon edge all the way around and were flying back and forth. Total counts for the north beach were 73 western snowy plovers (WSP), 150+ surf scoter (offshore), 2 common raven, 250+ sanderlings, 2 least sandpipers, 130+ black-bellied plovers. Carcasses found were one scoter being scavenged by ravens, one northern fulmar and one double crested cormorant.

On the south side of Skunk Point there were two more WSP, 37 sanderlings, 7 black-bellied plovers and two common raven. Western grebes, surfscoters and Loons were common offshore. There was one northern fulmar carcass. All carcasses had been scavenged. None were oiled. The beach was wide (about 50-60 m). At Oat Point there was one great blue heron, 3 black

oystercatchers, 7 black turnstones, and two brown pelicans. Old Ranch canyon had 4 sanderlings, 5 black-bellied plovers on the beach and on the lagoon were 4 mallards, 5 other ducks (possibly gadwall), a male bufflehead, and four American coots. At the rocky point there were 17 black bellied plover, 34 sanderlings, and 10 black oystercatchers. No birds were seen on the lagoon at Old Ranch House Canyon. On the beach there were 40 sanderlings, 5 black bellied plover, and scoters and gulls offshore. We completed the shore surveys at 1500 hrs.

Squid boats were anchored off shore from Old Ranch Canyon. One boat was anchored just north of Skunk Point and was lighting there in the evening. One boat was anchored approximately 100 m from Old Ranch Creek mouth but moved on in the afternoon. Sarah had some *Dudleya candelabrum* plant above the big lagoon which we did until almost sunset. The ranch caretaker was shooting deer above Old Ranch Canyon.

January 9, East Point. Low tide -0.8 ft. at 1652. Partly cloudy, moderate wind and cool. We were able to drive part way out Old Ranch Canyon. I walked the beach from Old Ranch Lagoon to East Point. The squid boats had shifted to East Point from off Old Ranch Canyon the day before. There were 16 boats off East Point with more headed that way. We saw a herd of 100 or more Risso's dolphin in Becher's Bay where squid boats had been anchored the night before. There has been a large fleet of 20-24 boats fishing squid off Christi beach all week too. The bufflehead and other ducks were still at Old Ranch Creek. The great blue heron, 5 black oystercatchers and one black bellied plover were at the rocky point. At Old Ranch House beach there were at least 60 sanderlings, and 40 black-bellied plovers. The osprey was in the area. There were about 200 gulls, mostly herring gulls and then over 500 gulls (Herrmann's, western, herring) at Abalone Rocks with about 110 harbor seals. There were more gulls offshore. On the pocket beaches there were 2 black oystercatchers and 3 least sandpipers. There were about 200 more gulls at East Point and four black oystercatchers again. The gulls are presumably attracted to the squid boats in the area.

At East Point I shot a few area photos duplicating some from Jan 5th, and scored the surfgrass transects. *Phyllospadix torreyi* cover in the three transects was 95, 87, and 94%. (*P. scouleri* does occur at East Point but is mostly above the transect end bolts.) There were no problems finding the transect marker bolts. I expected transect 3 to have the lowest cover but I happened to hit more sand gaps in transect 2. While the overall cover was high, the grass wasn't as deep as it is sometimes, and the sand level around the site was fairly high. Bleaching was estimated at about 10 % overall and 20% in transect 3. I estimated about 20% of the plants were abraded, indicated by broken blades. We have had some huge swells this fall.

Photoplot summary – mean % cover by zone at Santa Rosa Island, fall 2007 (5 plots/zone):

Site	ZoneName	Bare Rock	Barnacle	Tetraclita	Endocladia	Hesperophycus	Silvetia	Mussels	Turfweed	Leaf Barnacle	Misc Algae	Misc Animal	Tar
EP	Chthamalus/Balanus	39.4	42.4	0.0	7.2	7.0	0.8	0.2	0.0	0.0	2.4	0.2	0.2
EP	Endocladia	35.0	0.2	0.0	58.8	5.8	0.0	0.0	0.0	0.0	0.2	0.0	0.0
EP	Silvetia (Rockweed)	41.0	0.4	0.0	7.0	0.8	37.4	0.0	0.8	0.0	12.6	0.0	0.0
EP	Mussels	3.4	0.4	0.0	0.4	0.0	0.0	60.8	6.0	0.0	28.4	0.6	0.0
EP	Hesperophycus	32.8	3.4	0.0	45.0	17.0	1.0	0.0	0.0	0.0	0.8	0.0	0.0
FP	Chthamalus/Balanus	67.2	20.6	0.2	9.4	0.0	0.0	0.0	0.0	0.0	1.0	1.6	0.0
FP	Endocladia	40.8	0.0	0.0	38.0	0.0	0.0	3.0	0.0	0.0	17.2	1.0	0.0
FP	Mussels	30.6	0.0	0.2	0.4	0.0	0.0	32.8	11.2	0.0	22.0	2.6	0.0
JL	Chthamalus/Balanus	61.4	35.4	0.0	0.4	0.0	0.0	0.2	0.0	0.0	1.6	1.0	0.0
JL	Endocladia	54.8	0.8	0.2	27.6	0.0	0.0	11.4	0.0	0.2	4.8	0.2	0.0
JL	Mussels	20.2	0.0	0.2	0.0	0.0	0.0	14.0	17.4	0.4	22.8	25.0	0.0

January 11, Lobos Canyon. Low tide -0.4 ft. at 1754 hrs. Mostly sunny with high winds and surf. There were six pelagic cormorants and two black oystercatchers in the area. Two mallard ducks were on the small lagoon at the mouth of the canyon. We were on site from 1530 to 1730 hrs.

We tried to go to Northwest-Talcott via the Smith Highway as Earl said there was a section on the main road there was impassible. We were unable to get past Green Canyon because the approach was still too slippery and I was concerned about the condition of canyons to the west. As an alternative plan we decided that a collection of genetic samples from the north side of the island would be the next best thing and Lobos Canyon was the only access point we could get to. We helped out at the plant nursery the rest of the morning and early afternoon then Julia and I hiked out Lobos Canyon and began our collection.

I did a 20 minute search covering most of the reef on the west side of the canyon finding 60 *Pisaster ochraceus* and two *Haliotis cracherodii* (104, 116 mm). I saw a few more ochre stars when the tide dropped a little but not much more reef was exposed because of the way it drops off and is hit by the waves. Both abalone were on flat rock tucked in next to *Phragmatopoma californica*.

We were able to collect all the specimens for the genetic specimens. *Tetraclita* and *Pollicipes* were not abundant with the tide level we were working but there was no problem finding the 40 specimens needed. *Mastocarpus papillatus* was also not very common and most of the plants were pretty beat up by the surf so identification was sometimes a challenge. The inner reef had heavy growth of *Phragmatopoma californica* and *Anthopleura sola* were abundant. The inner reef also had a dense band of *Silvetia compressa* and a few *Hesperophycus californicus*. Under the canopy was a healthy community of *Tegula funebris*, *Lepidochitona hartwegii*, and limpets. *Nucella emarginata* were common. *Acanthina* sp. were rare. *Endocladia muricata* was common. *Mytilus californianus* were common on the point but individuals were not large and the bed was only one layer deep, typical for such an exposed reef.

January 12, China Camp to Bee Rocks. Low tide 0.0 at 1825. Earl declared the road drivable so I stayed to count snowy plovers on the south side. Julia went in on the plane this morning and Carolyn Green came out. I drove out to Mud Tank and checked the beach there for snowy plovers and found only elephant seals (65 pups, about 150 adults). We had arranged a shuttle and Sarah came out with the crew to pick me up above Bee Rock beach and we drove to China Camp. Sarah and Harold planted *Dudleya*. Carolyn and I started out at 1300 to count snowy plovers.

The waves from the southwest were very impressive forming large lines of breakers. The sky was clear and the wind was NW about 15 mph. There were several hundred elephant seals on China Camp Beach. We did not find any carcasses. With the high tides and winds everything has probably been washed away or buried recently. There was one immature bald eagle at Cluster Point and the usual song sparrows, horned larks, and American pipits on the beach. Only one black oystercatcher was seen at Bee Rock. I estimated about 150 elephant seal pups on China Camp Beach, 100 on Cluster point, another 50 on the Whetstone Canyon Beaches, and only about 60 more on the Bee Rock Beaches. We found 109 snowy plovers all on one stretch of beach below the no-name canyon west of Whetstone Canyon. There were nine banded birds among the group. We reached the truck at 1730hrs. Carolyn had her GPS tracking us and measured 6.3 miles.

Snowy plover band combinations

Left leg	Right leg
YY	OW
RO	GR
YA	YP
YAY	B
AW	YP
YY	YW
W	Y
WO	AO
V V	BY

January 13. I worked on the computer most of the day, and then drove to Johnson's Lee at 1500 hrs. to check the beaches. No snowy plovers were found. At Officers Beach, there were 121 female elephant seals, four adult males, and 55 pups. Elephant seals were scattered along the narrow beaches to the east, totaling about 10-15 seals with just a few pups. There were two black oystercatchers. Western gulls were ubiquitous. Four lobster traps had washed onto the reef just west of Officers Beach. The deep pocket beach with the rocky finger had 11 cows and 2 bulls (the immature bull was up in the dunes). Four pups and one California sea lion were also on the beach. Jolla Vieja had at least 18 pups and 83 adult elephant seals. Several were sprawled across the road. Immature males were lounging in the lagoon.

San Miguel Island January 17-22, 2008

(Database event #2007-L)

PURPOSE: To monitor rocky intertidal sites at San Miguel Island.

PERSONNEL: Dan Richards, Marine Biologist, Channel Islands National Park
Connie Jenkins, volunteer
Ian Williams, Park Ranger, Channel Islands National Park

PROCEDURE and general observations: we flew to San Miguel with Channel Islands Aviation. Standard procedures were followed for photographing fixed plots. Percent cover was determined from the digital images or in the field. Black abalone, *Haliotis cracherodii*, and seastars were counted in 30-minute searches and measured for size distribution. Owl limpets, *Lottia gigantea*, were measured in fixed one-meter radius plots at Otter Harbor and Harris Point. Photo plots were field scored at Cuyler Harbor only except for a few difficult plots at other sites. Motile invertebrates were counted at Cuyler Harbor only. The highest number of shorebirds and pinnipeds within 100m of each site was recorded.

Kristen Kusic was to come along and collect genetic samples for the CEQI grant project but we found out that we were not allowed to take ethanol on the plane. I had already given up one volunteer because of bunk scheduling conflicts so only Connie and I came out.

January 18, Cuyler Harbor. Low tide -0.7 ft. at 1323hrs. Water temperature was 14.5 C. The air temperature was about 18 C. The weather was excellent with a clear sky, calm wind, and light surge. There were about 60 elephant seals on the east end of the beach but only one seal came by the site later in the day. Four black oystercatchers were seen on the reef. There were 22 whimbrel and 1 willet on the beach when walked back to the station. The hike was about 45-50 minutes each way. We were on site from 1020-1710 hrs.

Taking advantage of the excellent weather, I field-scored the plots then conducted the motile invertebrate count. Ian stopped by and I had him count seastars. He found 155 *Pisaster ochraceus* total. Few large *Mytilus* were present in plot 401 and there was good recruitment seen with small mussels over much of the plot area. Mussels in plots 402 and 403 were enormous. There was at least one dead (gaping) mussel in plot 402. There was a good mix of motile invertebrates within the mussel bed. *Nucella emarginata* were common and a few *Ocenebra circumtexta* and *Acanthina* sp., were present. Small *Lottia gigantea* were fairly common. Generally there were not many *Nuttallina*. There were some large *Cyanoplax dentians* present in the rockweed plots. *Silvetia* was common. There were a few *Hesperophycus* sporelings along the upper edge of the *Silvetia* zone.

January 19, Otter Harbor. Low tide -1.2 ft. at 1411 hrs. We had excellent conditions with clear sky and light wind and swell. There were 26 harbor seals and one elephant seal at the site. Five black oystercatchers and one American oystercatcher were present on the reef. We were on site from 1030 to 1640 hrs. and the hike at either end of the day was about two hours.

I measured owl limpets in the five circle plots. There were a total of 145 in the five plots and a mean size of 39 mm. No major changes were seen in the photoplots. Corner markers were in pretty good shape but some of the brass tags are eroding and are hard to read.

Ian helped out with a 30-minute search of seastars counting 54 and measuring 55. I spent about three hours measuring abalone, and looking for tagged animals. I found 34 tagged abalone but 9 would not register on the logger; either too far back in a crevice to get the logger close enough or the epoxy was worn from rubbing on rock and the tag was exposed. I suspect that the integrity of the tag was lost if the glass was broken and so the tag would no longer respond to the logger. I measured or estimated the length of 177 abalone. About 150 were within the site area (east of reference bolt 2). There were more untagged abalone to the west in the last crevice we tagged abalone at last year. Since it was late I didn't search any further west. There was at least one shell that had a mark that looked like a lost epoxy tag. One empty fresh shell was found. One juvenile red abalone (26mm) was found between two large black abalone.

Nucella emarginata and small *Lottia* were common. Large *Lottia limatula* were common especially in the old owl limpet plots 486 which had only one *L. gigantea*. *Endocladia muricata* and *Mazzaella affinis* were both common and appeared to have recruited heavily last summer. Tidepool copepods, *Tigriopus californica*, were particularly abundant in the upper pools. *Bangia* and or *Porphyra* sp. was common on upper rocks and weathered tar was very common.

January 20, Crook Point. Low tide -1.5 ft. at 1454 hrs. Water temperature was 14.5 C. The weather was partly cloudy, cold, and windy making conditions unpleasant. The swell was moderate with spray coming over the outer reef much of the day. There were about 20 cormorants at the site when we arrived and two elephant seals were on the rocks above the site. Three elephant seals were on the small beach to the east. Six black oystercatchers were on the reef. We were on site from 1100 to 1600 hrs.

The sand in the surge channel was mostly gone and the rocks were covered by ephemeral algae mostly. I was only able to find the upper right corner of plot 382 but the whole area was uniform mussels. I field scored plot 399 because the algae are difficult to identify. *Endocladia* seemed abundant overall and recruitment was high based on the growth on plot corners. Both *Silvetia* and *Hesperophycus* were uncommon. *Mytilus californianus* were abundant throughout most of the reef. *Mytilus gallo-provincialis* were rare but present. *Balanus* and *Chthamalus* were present in only moderate abundance. *Anelipes japonica* was common but mostly as a crust. *Polysiphonia* sp. was abundant along the edges of the channel.

I did a 30 minute search finding only 17 black abalone. One abalone was present in plot 394, and one was just outside plot 393. Ian counted seastars, finding 90 *Pisaster ochraceus* in a 30-minute search. *Strongylocentrotus purpuratus* were noticeably uncommon in tidepools. I did not observe any diseased sea urchins.

January 21, Harris Point. Low tide -1.6 ft. at 1533 hrs. Water temperature was 14.5 C. We walked Simonton Cove Beach in the morning, noting about 30 elephant seals with at least three pups present. There were 26 black oystercatchers feeding in the sand. Western and Herring and possibly other gulls were also present mostly feeding around the remains of the blue whale at the

north end of the beach. The primary remains were blubber, two vertebrae, mandible bones and a partial skull. The lower third of the fetal whale remains in the center of the beach. I recovered an ear bone from the adult skull. At Harris Point there were five harbor seals and one (heavily scarred) bull elephant seal that filled the gravel beach in the center of the site. Six black oystercatchers were in the area and one pelagic cormorant was observed swimming by in the cove. We were on site from 1230-1715 hrs.

Lottia gigantea were abundant in all plots but plot 1 which is dominated by red algae. Large *Lottia limatula* were common in plots 1 and 2. A thirty-minute search only turned up 12 black abalone and seven *Pisaster ochraceus*. Red algae, mostly *Mazzaella affinis* and *Chondracanthus canaliculatus* were abundant in the lower zones of the site.

Chitons were common and large individuals were common. *Mopalia*, *Nuttallina* and *Tonicella* were all present. *Littorina* spp. appeared to be very abundant. *Balanus glandula* formed dense cover in several plots. *Strongylocentrotus purpuratus* were abundant here unlike Crook Point. *Hesperophycus* was common and looked healthy. *Tetraclita* were common. *Mytilus* were pretty sparse throughout all the plots. I scored several plots that looked like they would be difficult to score. Corner repairs were made to the plots where needed.

Lottia gigantea measurements at San Miguel Island. Data are for five plots pooled from each site

Site Code	Count Density	Area	Density	Count Sized	Mean Size	StDev	Min Size	Max Size
HP	202	15.71	12.862	202	35.30	15.01	12	77
OH	146	31.71	4.605	146	38.86	15.03	13	76

Site Code	%<20mm	%20-29mm	%30-39mm	%40-49mm	%50-59mm	%60-69mm	%70-79mm
HP	14.85%	24.26%	28.71%	12.87%	10.40%	5.45%	3.47%
OH	10.27%	23.29%	13.01%	29.45%	15.07%	5.48%	3.42%

Photoplot summary – mean % cover by zone at all sites, San Miguel Island, fall 2007 (5 plots/zone):

<i>Site</i>	<i>ZoneName</i>	<i>Bare Rock</i>	<i>Barnacle</i>	<i>Tetraclita</i>	<i>Endocladia</i>	<i>Hespero- phycus</i>	<i>Silvetia</i>	<i>Mussels</i>	<i>Turfweed</i>	<i>Leaf Barnacle</i>	<i>Misc Algae</i>	<i>Misc Animal</i>	<i>Tar</i>
CH	Chthamalus/Balanus	24.0	43.6	0.0	30.8	0.0	1.0	0.4	0.0	0.0	0.2	0.0	0.0
CH	Endocladia	36.0	6.0	0.0	23.0	0.0	11.0	10.0	0.2	0.0	12.2	1.6	0.0
CH	Silvetia (Rockweed)	16.4	0.0	2.2	1.4	0.0	65.8	0.2	0.8	0.0	9.8	3.4	0.0
CH	Mussels	21.2	3.0	6.2	0.0	0.0	0.0	48.2	2.4	2.4	5.2	11.4	0.0
CP	Chthamalus/Balanus	56.0	38.6	0.0	4.6	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
CP	Endocladia	48.0	6.4	0.4	17.2	1.2	0.0	10.0	0.6	0.4	14.8	0.8	0.0
CP	Silvetia (Rockweed)	36.2	1.4	0.0	13.6	3.8	0.0	28.0	0.4	1.4	15.0	0.2	0.0
CP	Mussels	17.4	0.6	0.8	0.0	0.0	0.0	62.6	11.8	1.0	5.8	0.0	0.0
HP	Chthamalus/Balanus	37.4	57.2	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.8	0.0	1.8
HP	Endocladia	25.4	6.2	0.4	30.8	14.2	0.0	1.6	0.0	0.0	21.2	0.2	0.0
HP	Mussels	42.2	1.0	0.6	1.2	0.4	0.0	24.2	0.0	0.8	28.8	0.8	0.0
HP	Tetraclita	26.0	0.8	6.0	1.2	0.0	0.0	14.0	9.2	0.0	40.8	2.0	0.0
HP	Hesperophycus	30.4	0.2	0.0	14.8	38.4	0.0	0.0	0.0	0.0	16.2	0.0	0.0
OH	Chthamalus/Balanus	41.0	32.2	0.0	0.0	0.0	0.0	0.0	7.0	0.0	19.8	0.0	0.0
OH	Endocladia	29.0	0.8	0.4	36.0	0.0	6.2	0.4	0.0	0.2	27.0	0.0	0.0
OH	Silvetia (Rockweed)	25.0	22.6	0.0	18.4	0.0	10.6	0.0	0.0	0.2	22.8	0.2	0.2
OH	Mussels	8.4	1.0	0.4	0.8	0.0	0.0	37.4	0.0	5.2	45.0	1.8	0.0

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. 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 2007 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>
SCFC	Santa Cruz	Fraser Cove	TEGGAL	<i>Tegula 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		

Table D2. Mean and Standard Error Values for Select Motile Invertebrate Species and Groups

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LESPPP	NUTSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR
SMOH	SP07	Silvetia	5	0.0	0.0	0.0	0.8	0.0	0.0	2.8	0.6	0.0	0.8	0.0	0.2	5.0	10.0	1027.5	0.0	0.0
SMOH	SP07	Endocladia	5	0.2	0.0	0.0	0.8	0.0	0.0	2.0	0.6	0.0	3.6	0.0	0.4	8.8	14.4	65.0	0.0	0.0
SMOH	SP07	Chthamalus/Balanus	5	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.0	0.0	32.2	0.0	0.0	1.3	1.3	640.0	0.0	0.0
SMOH	SP07	Mytilus	5	0.4	4.4	0.0	0.4	0.4	0.0	4.2	2.8	0.0	1.4	0.0	6.6	28.8	58.8	5.0	0.0	0.0
SMOH AVE				0.15	1.10	0.00	0.50	0.15	0.00	2.35	1.00	0.00	9.50	0.00	1.80	10.94	21.09	434.38	0.00	0.00
SMOH SE				0.04	0.49	0.00	0.09	0.04	0.00	0.35	0.28	0.00	3.39	0.00	0.72	2.74	5.74	109.15	0.00	0.00
SMHP	SP07	Hesperophycus	5	0.4	0.2	0.0	1.0	1.0	0.2	0.2	1.0	0.0	0.0	0.0	0.0	4.4	10.0	214.4	0.0	0.0
SMHP	SP07	Mytilus	5	2.0	1.0	0.0	3.2	0.4	2.4	1.4	15.0	0.0	0.0	0.0	2.2	38.1	61.3	58.1	0.0	0.0
SMHP	SP07	Endocladia	5	0.4	0.2	0.0	0.8	0.0	1.0	0.4	1.8	0.0	0.0	0.0	0.0	18.1	31.3	175.0	0.0	0.0
SMHP	SP07	Tetraclita	5	1.6	11.6	0.4	0.8	0.4	1.8	0.8	7.4	0.0	1.2	0.0	7.2	58.6	144.7	8.3	0.0	0.0
SMHP	SP07	Chthamalus/Balanus	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	9.4	11.3	887.5	0.0	0.0
SMHP AVE				0.88	2.60	0.08	1.16	0.36	1.08	0.56	5.24	0.00	0.24	0.00	1.88	25.72	51.69	268.66	0.00	0.00
SMHP SE				0.17	1.01	0.04	0.24	0.08	0.21	0.11	1.22	0.00	0.11	0.00	0.62	4.49	11.19	71.19	0.00	0.00
SMCH	SP07	Mytilus	5	0.8	7.2	0.0	3.4	0.0	0.2	0.8	17.4	0.0	0.0	0.0	4.4	58.8	111.9	0.0	0.0	0.0
SMCH	SP07	Silvetia	5	0.6	0.8	0.0	1.6	2.2	1.4	2.4	2.2	2.6	11.0	0.0	0.2	13.1	13.1	26.9	0.0	0.0
SMCH	SP07	Endocladia	5	0.4	0.2	0.0	2.2	0.2	0.0	2.8	3.4	3.0	12.8	0.2	0.8	38.1	37.5	69.4	0.0	0.0
SMCH	SP07	Chthamalus/Balanus	5	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.8	0.4	0.8	0.0	0.0	5.0	11.9	687.5	0.0	0.0
SMCH AVE				0.50	2.05	0.00	1.80	0.60	0.45	1.55	5.95	1.50	6.15	0.05	1.35	28.75	43.59	195.94	0.00	0.00
SMCH SE				0.06	0.77	0.00	0.32	0.24	0.14	0.28	1.72	0.34	1.50	0.02	0.46	5.47	10.51	73.56	0.00	0.00
SMCP	SP07	Mytilus	5	0.0	1.8	0.2	2.2	0.0	0.0	0.2	3.4	0.0	5.2	0.0	0.8	51.9	48.8	45.0	0.2	2.4
SMCP	SP07	Endocladia	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.2	0.0	0.0	194.4	166.3	217.5	0.0	0.0
SMCP	SP07	Silvetia	5	0.2	0.0	0.0	0.6	0.2	0.0	0.0	1.4	0.0	0.4	0.0	0.0	125.0	45.0	292.5	0.0	0.0
SMCP	SP07	Chthamalus/Balanus	5	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.8	0.4	0.8	0.0	0.0	5.0	11.9	687.5	0.0	0.0
SMCP AVE				0.10	0.45	0.05	0.70	0.05	0.05	0.10	1.50	0.10	1.65	0.00	0.20	94.06	67.97	310.63	0.05	0.60
SMCP SE				0.03	0.20	0.02	0.23	0.02	0.02	0.03	0.30	0.04	0.53	0.00	0.09	18.59	15.11	60.77	0.02	0.27

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LEPSPP	NUTSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR
SRFR	SP07	Endocladia	5	2.6	0.0	0.0	0.6	0.0	0.0	1.0	0.0	3.6	12.8	0.0	0.0	15.6	135.6	1035.1	0.0	0.0
SRFR	SP07	Mytilus	5	0.0	18.6	1.4	3.0	0.2	0.6	0.8	5.4	0.0	0.0	0.0	2.2	42.5	100.0	12.5	0.0	10.8
SRFR	SP07	Silvetia	5	4.0	0.0	0.0	1.4	0.8	0.8	2.8	0.2	5.0	34.2	0.0	0.0	5.6	100.0	760.0	0.0	0.0
SRFR	SP07	Chthamalus/Balanus	5	0.4	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.2	0.2	0.0	0.0	5.0	62.5	1370.0	0.0	0.0
SRFR AVE				1.75	4.65	0.35	1.30	0.25	0.35	1.25	1.40	2.20	11.80	0.00	0.55	17.19	99.53	794.39	0.00	2.70
SRFR SE				0.42	2.08	0.16	0.28	0.08	0.09	0.24	0.60	0.56	3.60	0.00	0.25	3.93	6.68	129.21	0.00	1.21
SRNWT	SP07	Endocladia	5	1.0	0.8	0.2	0.2	1.0	0.0	0.2	2.6	0.0	0.0	0.4	2.8	0.0	1.0	17.5	0.0	0.0
SRNWT	SP07	Chthamalus/Balanus	5	2.4	0.0	0.0	0.0	0.6	0.0	0.0	0.8	0.0	0.0	0.4	1.8	0.0	0.0	13.8	0.0	0.0
SRNWT	SP07	Silvetia	5	3.8	1.0	0.0	0.0	1.4	0.0	0.0	1.8	0.0	0.0	0.8	7.0	0.0	0.0	6.3	0.0	0.0
SRNWT	SP07	Hesperophycus	5	0.6	0.0	0.0	0.0	2.8	0.0	0.2	0.8	0.2	0.0	6.0	2.2	0.2	0.0	10.6	0.0	0.0
SRNWT AVE				1.68	2.96	0.04	3.20	2.44	0.00	0.40	1.68	0.36	0.00	1.52	2.76	0.04	1.20	15.25	0.00	0.00
SRNWT SE				0.62	2.52	0.04	3.15	1.06	0.00	0.30	0.38	0.31	0.00	1.13	1.16	0.04	0.97	3.71	0.00	0.00
SREP	SP07	Hesperophycus	5	0.6	0.0	0.0	0.0	2.8	0.0	0.2	0.8	0.2	0.0	6.0	2.2	0.2	0.0	10.6	0.0	0.0
SREP	SP07	Chthamalus/Balanus	5	1.0	0.0	0.0	0.0	0.2	1.6	0.0	0.8	0.4	0.0	3.4	3.2	0.0	0.0	8.1	0.0	0.0
SREP	SP07	Endocladia	5	0.2	0.4	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	4.2	0.6	0.0	0.0	11.9	0.0	0.0
SREP	SP07	Silvetia	5	5.0	1.8	0.0	0.0	2.4	0.2	0.2	0.4	0.4	0.0	11.4	21.2	0.0	0.0	23.1	0.6	0.4
SREP	SP07	Mytilus	5	0.4	3.8	0.0	4.4	7.6	0.0	1.0	0.2	15.4	0.0	0.2	0.2	0.0	1.0	127.5	0.0	0.0
SREP AVE				1.44	1.2	0.00	0.88	2.84	0.36	0.28	0.44	3.28	0.00	5.04	5.48	0.04	0.2	36.25	0.12	0.08
SREP SE				0.90	0.73	0.00	0.88	1.27	0.31	0.19	0.16	3.03	0.00	1.85	3.97	0.04	0.20	22.96	0.12	0.00
SRFP	SP07	Endocladia	5	1.0	6.2	0.2	0.2	1.8	0.0	0.4	0.2	6.8	0.0	0.4	4.4	0.0	0.8	186.3	0.0	0.8
SRFP	SP07	Mytilus	5	1.0	3.8	0.0	2.0	1.6	0.0	0.2	1.0	9.0	0.0	0.2	6.0	0.0	0.6	109.4	0.0	1.6
SRFP	SP07	Chthamalus/Balanus	5	0.2	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	29.4	0.0	0.0
SRFP AVE				0.73	3.33	0.07	0.73	1.20	0.07	0.20	0.40	5.27	0.00	0.20	3.60	0.00	0.47	108.33	0.00	0.80
SRFP SE				0.27	1.80	0.07	0.64	0.50	0.07	0.12	0.31	2.71	0.00	0.12	1.67	0.00	0.24	45.29	0.00	0.46

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LEPSP	NUTSP	FISVOL	PACCRA	PAGSP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSP	PISOCH	STRPUR
SRJL	SP07	Endocladia	5	0.4	0.4	0.0	0.2	0.0	0.0	0.0	3.0	0.0	0.0	0.0	1.0	22.5	195.6	232.5	0.0	0.0
SRJL	SP07	Mytilus	4	2.3	0.0	0.0	1.8	0.3	0.0	0.0	3.5	0.5	5.5	0.3	0.3	62.5	137.5	30.0	0.0	0.0
SRJL	SP07	Chthamalus/Balanus	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	0.2	14.4	0.0	0.0
SRJL AVE				0.88	0.13	0.08	0.00	0.65	0.08	0.00	0.00	2.17	0.00	0.17	1.83	0.08	0.48	33.13	0.00	0.00
SRJL SE				0.69	0.13	0.08	0.00	0.55	0.08	0.00	0.00	1.09	0.00	0.17	1.83	0.08	0.26	14.87	0.00	0.00
SCTR	SP07	Hesperophycus	5	3.0	0.0	0.0	1.8	0.0	0.2	0.6	0.2	3.2	15.6	0.0	0.0	7.5	28.1	235.0	0.0	0.0
SCTR	SP07	Mytilus	5	0.2	2.6	0.8	0.4	0.0	0.6	0.4	7.0	0.0	0.0	0.0	0.0	53.8	33.8	2.5	0.0	0.0
SCTR	SP07	Silvetia	5	4.6	0.0	0.0	0.4	6.8	0.4	3.4	0.0	5.8	90.2	0.6	0.0	4.4	21.3	15.6	0.0	0.0
SCTR	SP07	Chthamalus/Balanus	5	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5	0.0	0.0
SCTR AVE				2.00	0.65	0.00	0.20	0.70	1.70	0.30	1.10	1.80	0.00	2.25	26.45	0.15	0.00	23.28	0.00	0.00
SCTR SE				1.09	0.65	0.00	0.20	0.37	1.70	0.13	0.78	1.73	0.00	1.40	21.57	0.15	0.00	11.37	0.00	0.00
SCFC	SP07	Chthamalus/Balanus	5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.8	1.4	1.4	0.0	1.3	6.9	400.0	0.0	0.0
SCFC	SP07	Endocladia	5	0.0	0.6	0.0	1.2	0.0	0.0	0.2	0.2	1.0	0.8	0.0	0.0	7.5	23.1	59.4	0.0	0.0
SCFC	SP07	Hesperophycus	5	0.2	0.0	0.0	0.0	1.2	0.2	0.4	0.0	2.6	32.8	0.8	0.0	2.5	41.3	190.0	0.0	0.0
SCFC	SP07	Mytilus	5	0.0	0.8	0.4	1.4	0.0	0.0	0.2	8.2	1.6	2.2	1.8	0.6	6.9	54.4	2.5	0.0	0.0
SCFC	SP07	Silvetia	5	1.0	0.0	0.0	0.6	0.8	0.0	0.8	0.4	4.4	40.6	0.6	0.0	3.1	56.3	50.0	0.0	0.0
SCFC	SP07	Pollicipes	5	0.2	5.4	0.4	1.0	0.0	0.0	0.0	8.4	0.6	0.0	0.0	0.6	27.5	90.0	10.6	0.0	0.0
SCFC	SP07	tar	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	0.0	495.0	0.0	0.0
SCFC AVE				0.23	0.97	0.11	0.60	0.29	0.03	0.23	2.49	1.71	11.11	0.66	0.17	6.96	38.84	172.50	0.00	0.00
SCFC SE				0.06	0.33	0.03	0.10	0.08	0.01	0.05	0.67	0.25	2.98	0.12	0.05	1.60	5.32	33.73	0.00	0.00
SCOC	SP07	Chthamalus/Balanus	5	0.4	0.0	0.0	1.0	0.0	0.2	0.2	0.6	0.0	0.0	0.0	0.0	40.6	41.3	1095.0	0.0	0.0
SCOC	SP07	Hesperophycus	5	1.6	1.2	0.0	1.8	0.0	6.6	2.6	3.4	0.0	1.4	0.0	0.0	46.3	16.9	312.5	0.0	0.0
SCOC	SP07	Mytilus	5	0.0	8.6	0.6	2.0	0.2	7.4	0.4	7.4	0.0	0.0	0.0	0.0	15.0	21.9	0.6	0.2	0.4
SCOC	SP07	Silvetia	5	2.0	2.8	0.0	1.6	2.8	4.6	3.8	3.4	2.6	1.8	0.0	0.0	37.5	29.4	25.6	0.0	0.0
SCOC	SP07	Tetraclita	3	0.7	4.7	0.0	0.7	0.0	4.7	0.0	13.0	0.0	0.0	0.0	0.0	19.8	83.3	10.4	0.0	0.0
SCOC AVE				0.93	3.45	0.12	1.41	0.60	4.69	1.40	5.56	0.52	0.64	0.00	0.00	31.83	38.54	288.83	0.04	0.08
SCOC SE				0.17	0.70	0.06	0.12	0.26	0.58	0.36	1.00	0.24	0.19	0.00	0.00	2.85	5.56	97.82	0.02	0.04

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LEPSPP	NUTSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR
SCPH	SP07	Chthamalus/Balanus	5	1.8	1.2	0.2	0.6	0.0	0.8	1.8	1.2	1.0	1.6	0.0	0.0	30.0	93.8	163.1	0.0	0.0
SCPH	SP07	Endocladia	5	2.4	0.6	0.0	6.2	0.0	1.6	0.8	1.4	4.0	2.6	0.0	0.0	16.3	42.5	610.6	0.0	0.0
SCPH	SP07	Hesperophycus	5	0.4	0.2	0.0	0.4	0.0	0.0	0.4	2.2	3.6	1.8	0.6	0.0	15.6	59.4	2705.0	0.0	0.0
SCPH	SP07	Mytilus	5	0.0	0.0	2.6	3.0	0.0	4.0	0.0	10.2	5.4	0.0	0.0	0.0	5.6	28.8	1.3	0.0	0.0
SCPH	SP07	Silvetia	5	0.2	0.4	0.0	1.8	0.0	0.2	0.0	0.4	0.2	0.0	0.0	0.0	8.1	44.4	411.9	0.0	0.0
SCPH AVE				0.96	0.48	0.56	2.40	0.00	1.32	0.60	3.08	2.84	1.20	0.12	0.00	15.13	53.75	778.38	0.00	0.00
SCPH SE				0.21	0.09	0.23	0.47	0.00	0.32	0.15	0.81	0.43	0.23	0.05	0.00	1.90	4.97	220.38	0.00	0.00
SCSR	SP07	Chthamalus/Balanus	5	0.2	0.4	0.0	1.0	0.0	0.6	0.6	0.4	1.0	0.0	0.0	0.0	16.3	58.8	480.0	0.0	0.0
SCSR	SP07	Endocladia	5	1.6	1.2	0.4	2.0	0.0	1.0	0.6	0.4	1.0	0.0	0.0	0.0	45.0	30.0	502.5	0.0	0.0
SCSR	SP07	Hesperophycus	5	0.2	0.2	0.4	0.8	0.6	0.6	5.6	0.0	1.0	5.4	0.0	0.0	11.3	27.5	71.9	0.0	0.0
SCSR	SP07	Mytilus	5	2.0	22.4	15.4	1.0	0.2	18.6	0.2	0.0	0.0	0.0	0.0	0.0	42.5	49.4	0.6	0.2	1.6
SCSR	SP07	Tetraclita	5	1.2	18.2	1.8	1.0	0.0	4.0	4.4	0.4	2.0	0.0	0.0	0.0	70.6	190.0	41.3	0.0	0.0
SCSR AVE				1.04	8.48	3.60	1.16	0.16	4.96	2.28	0.24	1.00	1.08	0.00	0.00	37.13	71.13	219.25	0.04	0.32
SCSR SE				0.16	2.18	1.33	0.10	0.05	1.55	0.50	0.04	0.14	0.48	0.00	0.00	4.82	13.55	49.94	0.02	0.14
SCWA	SP07	Endocladia	5	1.2	0.2	0.0	0.0	0.4	0.0	0.4	0.8	0.0	0.0	0.0	0.0	3.1	15.6	472.5	0.0	0.0
SCWA	SP07	Hesperophycus	5	3.0	0.2	0.0	1.0	5.0	0.0	12.4	0.0	5.6	0.2	1.4	0.0	20.0	64.4	363.1	0.0	0.0
SCWA	SP07	Mytilus	5	0.4	0.8	0.4	4.4	0.0	0.8	1.6	21.2	0.0	0.0	0.0	0.0	5.0	50.6	0.6	0.2	0.0
SCWA	SP07	Silvetia	5	7.8	1.6	0.2	2.2	4.0	1.2	4.8	2.6	5.8	0.0	0.0	0.0	50.0	129.4	175.0	0.0	0.0
SCWA AVE				3.10	0.70	0.15	1.90	2.35	0.50	4.80	6.15	2.85	0.05	0.35	0.00	19.53	65.00	252.81	0.05	0.00
SCWA SE				0.74	0.15	0.04	0.42	0.56	0.13	1.21	2.26	0.74	0.02	0.16	0.00	4.85	10.64	46.56	0.02	0.00
ANMW	SP07	Chthamalus/Balanus	5	7.4	5.8	0.4	4.2	0.0	2.4	1.6	3.8	7.4	0.0	0.0	0.4	18.8	45.6	135.6	0.0	0.0
ANMW	SP07	Silvetia	5	3.8	7.8	3.0	3.8	0.4	2.6	3.0	1.4	2.8	0.0	0.0	1.4	10.0	23.1	5.6	0.0	0.8
ANMW	SP07	Endocladia	5	1.6	5.4	1.0	2.4	0.8	3.6	3.0	5.8	7.6	0.0	0.0	0.4	11.3	43.1	65.6	0.0	0.2
ANMW	SP07	Mytilus	5	1.0	6.2	4.0	4.4	1.4	5.8	3.4	8.2	3.8	0.0	0.0	1.4	8.8	48.8	0.0	0.0	0.0
ANMW AVE				3.45	6.30	2.10	3.70	0.65	3.60	2.75	4.80	5.40	0.00	0.00	0.90	12.19	40.16	51.72	0.00	0.25
ANMW SE				0.65	0.24	0.38	0.20	0.13	0.35	0.18	0.65	0.55	0.00	0.00	0.13	1.00	2.59	14.16	0.00	0.08

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LEPSP	NUTSP	FISVOL	PACCRA	PAGSP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSP	PISOCH	STRPUR
ANSFC	SP07	Chthamalus/Balanus	5	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	23.1	251.3	0.0	0.0
ANSFC	SP07	Endocladia	5	0.0	0.6	0.0	0.0	0.0	0.0	0.8	0.2	0.2	0.4	0.0	0.0	3.1	7.5	23.1	0.0	0.0
ANSFC	SP07	Silvetia	5	0.4	0.2	0.0	0.8	0.0	0.0	0.6	0.2	2.2	1.0	0.0	0.0	2.5	29.4	25.6	0.0	0.0
ANSFC	SP07	Mytilus	5	0.4	4.8	1.2	3.6	0.0	1.4	0.0	11.0	5.8	0.0	0.0	0.0	15.0	36.3	0.0	0.0	0.0
ANSFC AVE				0.20	1.45	0.30	1.15	0.00	0.35	0.35	2.85	2.05	0.35	0.00	0.00	5.78	24.06	75.00	0.00	0.00
ANSFC SE				0.05	0.50	0.13	0.37	0.00	0.16	0.09	1.22	0.60	0.11	0.00	0.00	1.38	2.74	26.40	0.00	0.00
ANSFC	FA07	Chthamalus/Balanus	5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	18.8	280.6	0.0	0.0
ANSFC	FA07	Endocladia	5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.7	3.7	20.6	0.0	0.0
ANSFC	FA07	Silvetia	5	0.0	0.4	0.0	1.4	0.0	0.0	0.2	0.0	1.2	0.8	0.0	0.0	2.5	7.6	3.4	0.0	0.0
ANSFC	FA07	Mytilus	5	1.2	0.6	0.0	0.2	0.0	0.0	0.0	0.4	1.0	0.0	0.0	0.0	21.3	45.0	0.0	0.0	0.0
ANSFC AVE				0.25	0.90	0.15	0.80	0.00	0.18	0.20	1.48	1.38	0.28	0.00	0.00	6.38	21.41	75.58	0.00	0.00
ANSFC SE				0.13	0.06	0.00	0.14	0.00	0.00	0.02	0.04	0.12	0.09	0.00	0.00	2.13	4.16	30.55	0.00	0.00
SBLC	FA07	Silvetia	5	0.0	0.4	0.4	0.2	1.6	1.0	2.4	0.0	1.2	0.2	0.0	0.2	0.0	17.5	3.1	0.0	0.0
SBLC	FA07	Chthamalus/Balanus	5	0.8	2.6	0.0	0.4	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	4.4	101.3	338.8	0.0	0.0
SBLC	FA07	red algae	5	0.0	0.2	1.4	0.6	0.8	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.2
SBLC	FA07	Mytilus	5	0.4	2.6	1.8	2.8	0.2	11.2	0.0	0.0	0.0	0.0	0.0	0.2	8.1	93.1	0.6	3.8	2.6
SBLC AVE				0.30	1.45	0.90	1.00	0.65	4.25	0.60	0.00	0.35	0.05	0.00	0.10	3.13	53.52	85.63	0.95	0.70
SBLC SE				0.09	0.30	0.19	0.27	0.16	1.10	0.27	0.00	0.13	0.02	0.00	0.03	0.88	11.39	37.73	0.42	0.28
SBSLR	FA07	Silvetia	5	0.2	0.2	0.6	2.6	24.0	0.8	10.2	0.0	0.0	0.0	0.0	3.0	0.0	18.1	0.6	0.0	0.0
SBSLR	FA07	Endocladia	5	0.0	0.6	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	1.3	3.1	35.6	0.0	0.0
SBSLR	FA07	Chthamalus/Balanus	5	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	223.1	0.0	0.0
SBSLR	FA07	Mytilus	5	0.0	0.6	3.0	2.6	0.0	9.4	5.0	0.0	0.0	0.0	0.0	0.2	0.6	61.9	0.0	0.8	1.6
SBSLR AVE				0.05	0.35	0.90	1.30	6.00	2.65	3.95	0.00	0.00	0.00	0.00	0.85	0.47	20.77	64.84	0.20	0.40
SBSLR SE				0.02	0.07	0.32	0.34	2.68	1.01	1.06	0.00	0.00	0.00	0.00	0.32	0.13	6.38	23.89	0.09	0.18

Site ID	Sampling Season Code	Target Zone	# Plots Sampled	LEPSPP	NUTSPP	FISVOL	PACCRA	PAGSPP	OCECIR	LIMPLG	NUCEMA	ACASPP	TEGFUN	TEGGAL	LOTGIG	LSMALL	LMDALL	LITSPP	PISOCH	STRPUR
ANMW	FA07	Chthamalus/Balanus	5	1.8	1.0	0.0	2.2	0.4	0.0	0.0	0.8	2.4	0.0	0.0	0.4	32.5	29.4	21.3	0.0	0.0
ANMW	FA07	Silvetia	5	0.4	0.8	0.0	2.2	0.4	0.0	0.0	0.8	2.6	0.0	0.0	0.6	13.8	38.8	5.6	0.0	2.4
ANMW	FA07	Endocladia	5	2.2	1.4	0.0	3.2	1.8	0.0	0.0	4.8	5.4	0.0	0.0	0.4	28.8	29.4	17.5	0.0	0.0
ANMW	FA07	Mytilus	5	1.0	1.4	0.0	0.8	0.0	0.0	0.0	2.0	0.8	0.0	0.0	1.4	42.5	74.4	8.8	0.0	0.0
ANMW AVE				1.35	1.15	0.00	2.10	0.65	0.00	0.00	2.10	2.80	0.00	0.00	0.70	29.38	42.97	13.28	0.00	0.60
ANMW SE				0.18	0.07	0.00	0.22	0.18	0.00	0.00	0.42	0.43	0.00	0.00	0.11	2.67	4.78	1.64	0.00	0.27

* Refer to Table D1 for definitions of site, species and group codes. SP=spring, FA=fall.

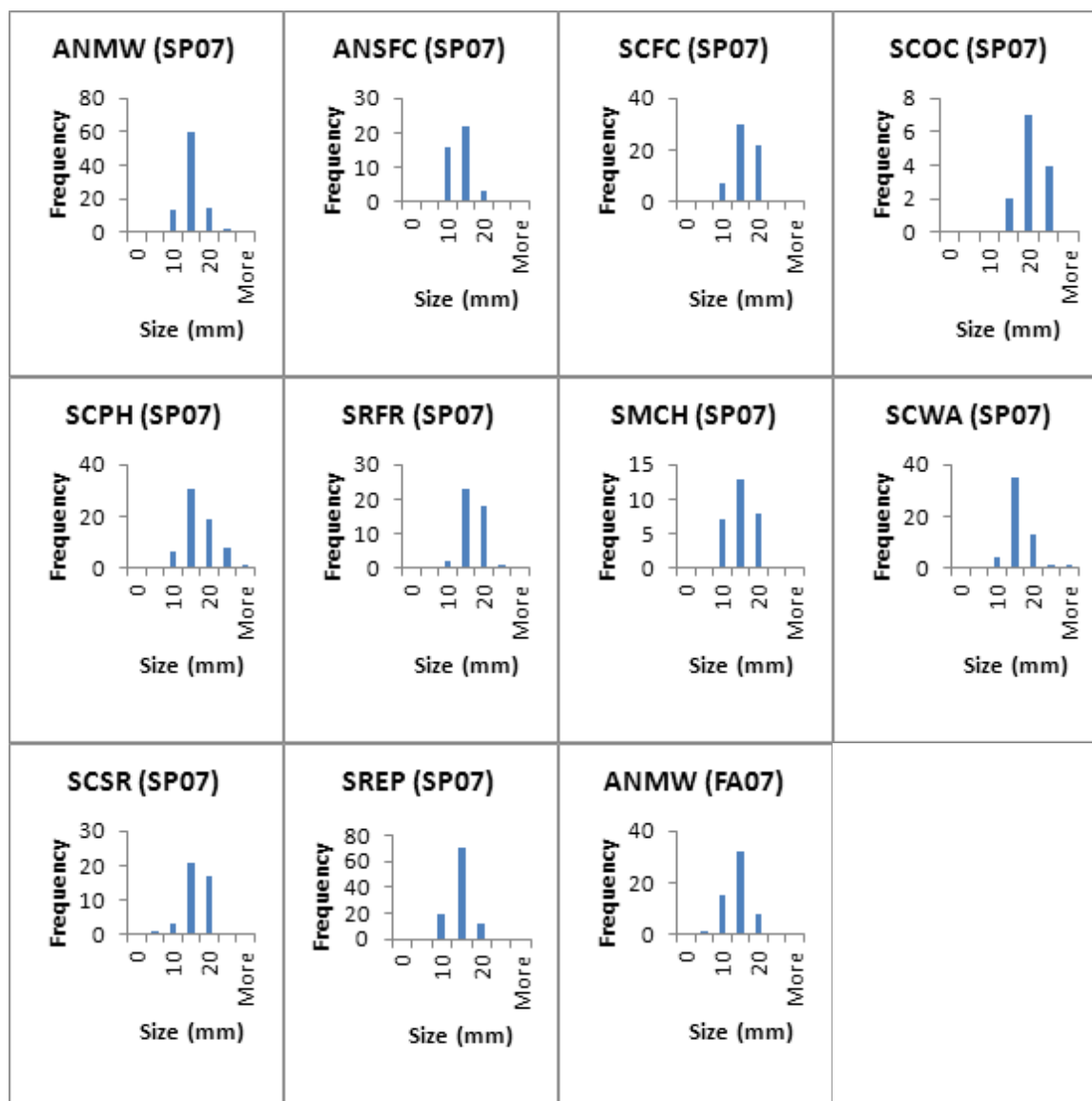


Figure D-1. *Acanthina* spp. size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Acanthina*.

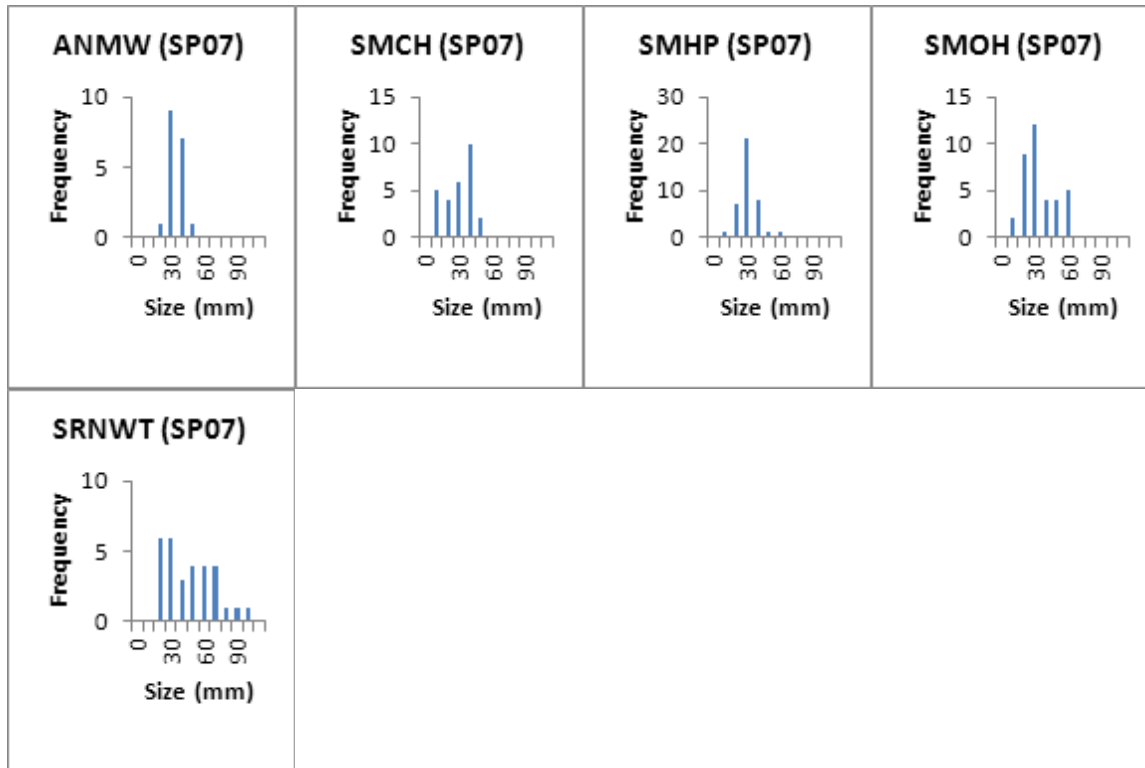


Figure D-2. *Lottia gigantea* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Lottia gigantea*.

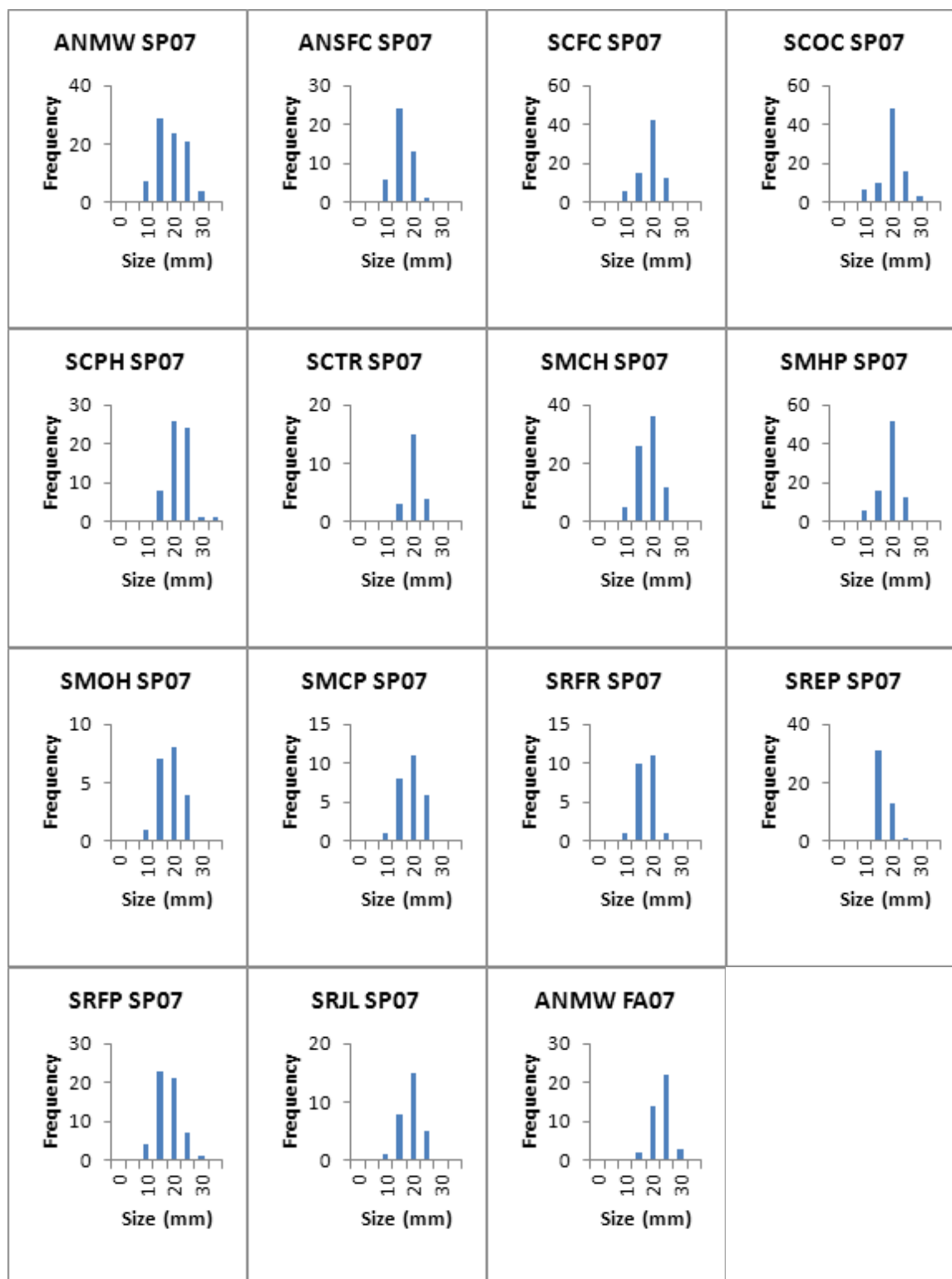


Figure D-3. *Nucella emarginata/ostrina* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Nucella*.

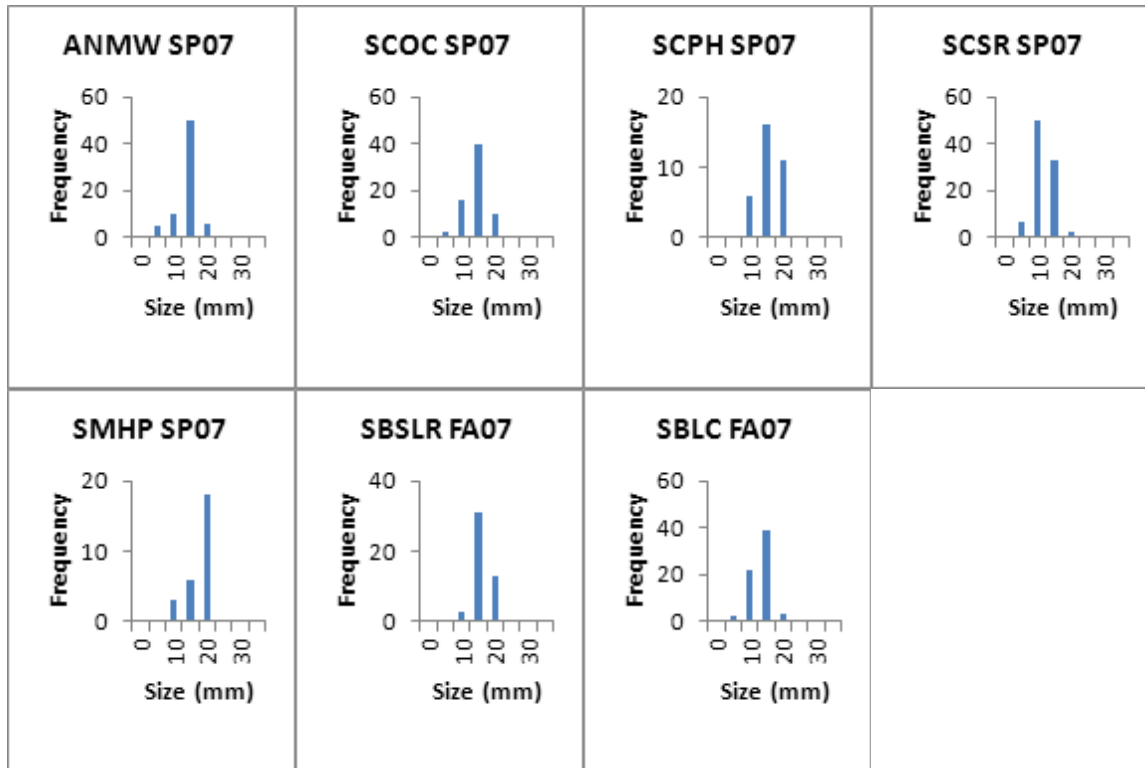


Figure D-4. *Ocenebra circumtexta* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Ocenebra*.

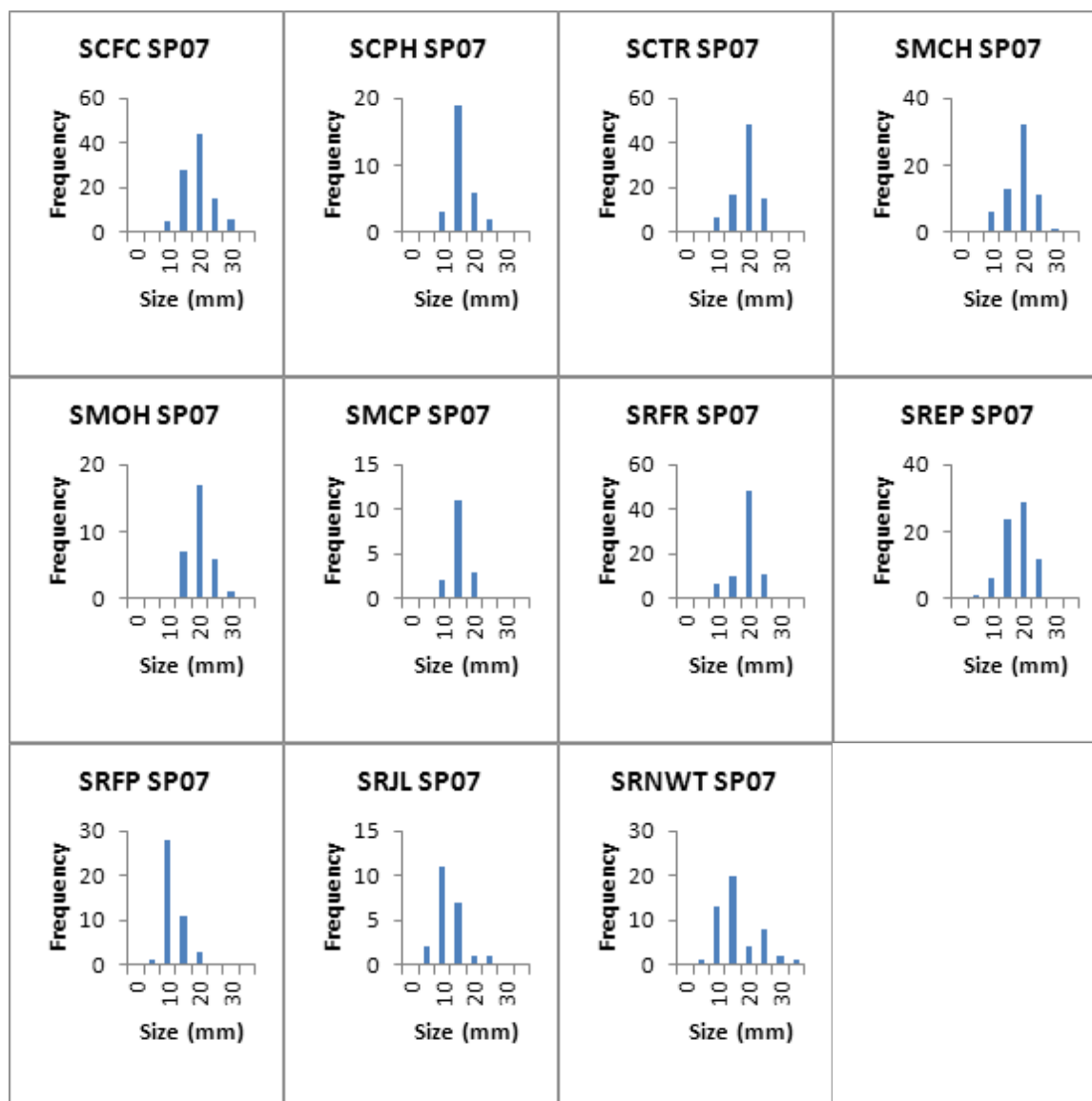


Figure D-5. *Tegula funebris* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Tegula*.

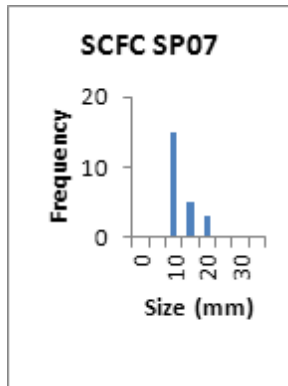


Figure D-5. *Tegula gallina* size distributions in all plots. Figures show proportion of total (note that y-axes vary by graph) and do not reflect overall abundance. Some sites are not shown due to insufficient abundances of *Tegula*.