



# Rocky Intertidal Community Monitoring at Channel Islands National Park

## *2012 Annual Report*

Natural Resource Report NPS/MEDN/NRR—2015/1043



## **ON THE COVER**

*Haliotis cracherodii* (black abalone)  
Photograph by: S. Whitaker

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# **Rocky Intertidal Community Monitoring at Channel Islands National Park**

## *2012 Annual Report*

Natural Resource Report NPS/MEDN/NRR—2015/1043

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## Abstract/Executive Summary

Channel Islands National Park includes the five northern islands off the coast of southern California and the surrounding waters out one nautical mile. There are approximately 176 miles of coastline around the islands, about 80% of which is composed of rock. The diversity and undisturbed nature of the tidepools of this rocky coastline were recognized as special features 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 1998. Site selection considered visitation, accessibility, presence of representative organisms, wildlife disturbance, and safety. This report summarizes the 2012 sampling year efforts (from March 2012 to January 2013) and findings of the Channel Islands National Park (CINP) Rocky Intertidal Community 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 have been monitored twice per year at 21 sites on the five park islands (Figure 1) as part of the Rocky Intertidal Community Monitoring Program. Fixed photo-plots were used to monitor the percent cover of thatched and acorn barnacles (*Tetraclita rubescens*, *Balanus glandula*/*Chthamalus* spp., respectively), mussels (*Mytilus californianus*), rockweeds (*Silvetia compressa*, and *Hesperophycus californicus*), turfweed (*Endocladia muricata*), red algal turf (*Pterocladia* spp. and *Gelidium* spp.), goose barnacles (*Pollicipes polymerus*) and tar. Point-intercept transects were used to determine the percent cover of surfgrass (*Phyllospadix* spp.). Information about size distribution (i.e. “size-frequency” data) was collected for owl limpets (*Lottia gigantea*) in circular plots. Size distribution and relative abundance of black abalone (*Haliotis cracherodii*) and ochre sea stars (*Pisaster ochraceus*) were determined using timed searches. The maximum number of shorebirds and pinnipeds seen at one time were counted at each site. The number of concession boat visitors to the Anacapa tidepools was collected and reported.

Some sites including Anacapa Middle East, Cat Rock, Landing Cove, Orizaba Cove, Scorpion Rock and Sea Lion Rookery were not monitored in spring due to a combination of inclement weather, logistical difficulties and to avoid disturbing nesting California brown pelicans. All but two sites, however, (Anacapa Middle East and Fossil Reef) were sampled during the fall monitoring season. Weather conditions during the spring and fall site-visits were satisfactory, but high wind coupled with strong swell and surge limited some of the abalone and sea star searches.

Most key species or assemblages targeted in the photo-plots were highly variable among sites. Seasonal variation could not be determined for the sites not sampled in spring 2012. However, for the sites that were sampled twice during the year, abundances of key target sessile species, with perhaps

the slight exception of turfweed, remained comparable between spring and fall. Mussels and both rockweeds occurred in low abundances again this year at the majority of sites compared to combined averages for previous years. All three species have decreased markedly during the last several years at most sites. Barnacle abundances were comparable to long-term averages at approximately half the sites sampled in spring and fall. Turfweed cover remained roughly equivalent to mean abundances measured in past years at most sites during both monitoring seasons.

Black abalone abundances at the islands are still less than one percent of 1985 population levels. Only three black abalone were seen within fixed plots in 2012. Zero abalone was found at Cuyler Harbor, Northwest-Talcott, Sea Lion Rookery and South Frenchy's Cove. With few exceptions, counts at all sites were consistent with the range of counts seen in recent years. Anacapa and Santa Cruz Island size frequencies for black abalone indicate the effects of recruitment in recent years since the populations are skewed towards smaller (< 50 mm) animals. The opposite is true at San Miguel Island where we continue to find very few juvenile abalone; instead, the population is dominated by larger, and presumably, older individuals.

Ochre sea stars were moderately abundant in 2012 at most sites around the islands. More than 500 ochre sea stars were counted during 30-minute searches at one site (Willows Anchorage), and 100-500 sea stars were counted at approximately half of all sites monitored during spring, fall or both seasons. Ochre sea star populations at most sites followed normal size frequency distributions with modes typically between 70 mm and 150 mm with few exceptions.

Giant owl limpet densities varied minimally at most sites in 2012 compared to past years. However, negative changes in abundances were measured at Anacapa and particularly San Miguel sites. The mean sizes of giant owl limpet in 2012 varied spatially among sites and islands, and to a lesser degree, temporally within most sites. The smallest limpets were measured at Ford Point and the largest individuals were seen at Northwest-Talcott and Trailer.

Surfgrasses are typically monitored biannually at two sites each on Santa Cruz and Santa Rosa Islands. Surfgrass cover remained comparable between spring and fall at all four sites. At Fraser Cove, surfgrass abundances have been increasing since 2007. The opposite is true at Trailer, whereby surfgrass cover has been slowly decreasing in recent years. Surfgrass cover at both sites monitored on Santa Rosa Island has remained relatively stable over time.

Black oystercatchers were the most ubiquitous shorebird seen at all sites; seasonal abundances were slightly higher compared to recent years. One American oystercatcher was present at two sites. Black turnstones were not as common as they have been in recent years; a small flock was observed at only one site. Other notable observations include several relatively-large (30-35 birds) flocks of gulls counted at Anacapa Middle West, Fossil Reef and Northwest-Talcott in spring.

Harbor seals, *Phoca vitulina*, were seen at five sites in 2012. As in past years, harbor seals were most abundant at Otter Harbor. Elephant seals, *Mirounga angustirostris*, were seen at six sites during the year. California sea lions, *Zalophus californianus*, were observed at Sea Lion Rookery and Landing

Cove, Santa Barbara Island. Approximate numbers of sea lions at the two sites ranged 26-200. Additionally, one sea lion was seen at Otter Harbor in spring.

Visitation to all but two intertidal sites, South Frenchy's Cove on Anacapa and Prisoner's Harbor at Santa Cruz, is low or nonexistent. Frenchy's Cove, however, receives moderate usage due to its close proximity to the mainland and relative ease of access. In 2012, Island Packers Company conducted 10 trips to Frenchy's Cove to allow visitors access to the tidepools. Total visitation was 681 passengers. Most visitation (66%) occurred during February through May with March being the busiest month (297 visitors).



## Acknowledgments

The National Park Service, Channel Islands National Park (CINP) funded this program. The NPS Mediterranean Coast Network Inventory and Monitoring Program provided support for data analyses and database assistance. California Department of Fish and Wildlife and Channel Islands National Marine Sanctuary (CINMS) provided staff time and general assistance on several events. Boat time (two days in spring and five in fall) was provided by CINMS. Temperature loggers 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.

In 2012 we received additional funding from the National Marine Fisheries Service Endangered Species Program to hire biological technician Andrew Domingos for another year to assist with additional sampling for black abalone. Andrew’s assistance in the field along with digital file management was greatly appreciated.

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We are especially grateful for the database support that Lena Lee (MEDN I&M) provided to ensure smooth program operation.



## Glossary

|        |                                                             |
|--------|-------------------------------------------------------------|
| ANI    | Anacapa Island                                              |
| C      | Centigrade                                                  |
| 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                              |
| PVC    | Polyvinyl chloride                                          |
| 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, biologically diverse area between marine and terrestrial habitats. Marine organisms living in this zone are highly adapted to physical disturbance and severe temperature fluctuations. They 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, evident in the vast number of organisms that cannot live without the alternating exposure to both air and sea.

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



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.

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

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

Rocky intertidal monitoring initially began at Anacapa Island (VTN Oregon 1984) following concerns that visitor usage (e.g., trampling, collecting, etc.) may increase and thus negatively impact rocky intertidal communities (Littler 1978). Beginning in 1985, the program was expanded to include sites at Santa Barbara, Santa Rosa and San Miguel Islands. Sites were added at Santa Cruz Island in 1994-1998 by UCSB personnel and assumed by CINP in 1998. Sampling site locations were chosen subjectively based on accessibility, safety and the relative locations of target organisms, among other variables.

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 (see Ambrose et al. [1992, 1995] and Murray et al. 2006). A sampling design involving fixed plots was selected, therefore, in an attempt to maximize the ability to detect temporal changes in target species distribution and abundance. The disadvantage of this sampling design is that results from plots cannot be extrapolated to the larger, un-sampled population (Engle 2008), and statistical comparison among sites is not possible (Murray et al. 2006).

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, the goal is to standardize collection of data at sites spanning from Baja California to Alaska, including the Channel Islands, and make it available to member groups in a centralized database (Engle 2008). By working with MARINe we have access to consistent data that can be used for much broader regional analyses of changes to intertidal communities.

This report summarizes the 2012 sampling year efforts (from March 2012 to January 2013) and documents activities and observations of the CINP Rocky Intertidal Community Monitoring Program. Monitoring results were previously reported in Richards 1986, 1988, 1998; Richards and Lerma 2000, 2002, 2005a, 2005b; Richards et al. 2011, Richards and Rich 2009, 2012; Richards and

Whitaker 2012a, 2012b, 2012c, 2012d; and Whitaker and Richards 2012. 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 comprised eight islands in the Southern California Bight; five of the islands are located within the CINP. The five park islands have about 323 kilometers (176 miles) of coastline, the majority (approximately 80%) of which is rocky shore. 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 (Dailey 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 throughout the year with storms bringing high northwest wind and waves during the winter and spring, and distant southern hemisphere storms sending large swells to the south-facing shores in summer.

### Monitoring

The CINP Rocky Intertidal Community Monitoring Program has 21 sites on the five park islands (Figure 1) that were established between 1982 and 1998. Sites generally consist of an array of 15-35 photoplots, 3-5 irregular-shaped and circular plots used to monitor black abalone and owl limpet densities, respectively, and *P. ochraceus* transects. Surfgrass transects are monitored at four sites. 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 2012, monitoring occurred at 16/21 sites in spring (March-May) and 18/21 sites in fall (October - January 2012). Monitoring protocols detailed in Richards and Davis (1988) and Engle et al. (1998) were followed. Updated protocol summaries can be found in Richards and Lerma (2000), Richards et al. (2011), and Engle (2008).

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

The percent coverage of thirteen core species or assemblages is monitored in fixed photoplots (Table 1). The chosen target species and assemblages commonly occur throughout the SCB and are 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., respectively), 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 substrata. An additional 32 taxa or substrata are

also monitored when present (see Table 1 for list of taxa<sup>1</sup>). Fixed plots (50 x 75 cm) are photographed on each visit. In most cases, there are five replicate plots in each zone that were initially established over high densities of the target species. Not all core species (zones) are represented at each site. Four new *M. californianus* plots were established in the *Mytilus* zone at Johnson's Lee in fall 2008 to replace plots that had been devoid of mussels for over 15 years (Whitaker and Richards 2012).

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<sup>1</sup> 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 (Engle 2008).

Table 1. Core Species, Higher Taxa, and Substrata Scored in Photoplots, Point Intercept Transects, Circular Plots, Abalone/Seastars, and Mobile Invertebrate\* Counts at all CINP Sites.

| (Target species are shown in bold.)                                        | Photo plots | Surfgrass Transects | Circular Plots | Abalone/ Sea star | Motile Inverts |
|----------------------------------------------------------------------------|-------------|---------------------|----------------|-------------------|----------------|
| <b>GREEN ALGAE</b>                                                         |             |                     |                |                   |                |
| <i>Cladophora columbiana</i>                                               | X           |                     |                |                   |                |
| <i>Ulva/Enteromorpha</i>                                                   | X           |                     |                |                   |                |
| Other Green Algae (any greens not listed above)*                           | X           | X                   |                |                   |                |
| <b>BROWN ALGAE</b>                                                         |             |                     |                |                   |                |
| <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                   |                |                   |                |
| <b><i>Hesperophycus californicus</i></b> (= <i>H. harveyanus</i> )         | X           |                     |                |                   |                |
| <i>Sargassum muticum</i>                                                   |             | X                   |                |                   |                |
| <i>Scytosiphon</i> spp.                                                    | X           |                     |                |                   |                |
| <b><i>Silvetia compressa</i></b> (= <i>Pelvetia fastigiata</i> )(Rockweed) | X           |                     |                |                   |                |
| Other Brown Algae (any browns not listed above)*                           | X           | X                   |                |                   |                |
| Ephemeral browns                                                           | X           |                     |                |                   |                |
| <b>RED ALGAE</b>                                                           |             |                     |                |                   |                |
| <b><i>Endocladia muricata</i></b> (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                   |                |                   |                |
| <b>ALGAE/PLANTS</b>                                                        |             |                     |                |                   |                |
| <b><i>Phyllospadix scouleri/torreyi</i></b> (Surfgrass)                    | X           | X                   |                |                   |                |
| Non-Coralline Crusts (reds and browns)                                     | X           | X                   |                |                   |                |
| Other Plant/Algae*                                                         |             | X                   |                |                   |                |
| <b>ANEMONES</b>                                                            |             |                     |                |                   |                |
| <i>Anthopleura elegantissima/sola</i> (Green Anemone)                      | X           | X                   |                |                   |                |
| <b>POLYCHAETE WORMS</b>                                                    |             |                     |                |                   |                |
| <i>Phragmatopoma californica</i>                                           | X           | X                   |                |                   |                |

\* Motile Invertebrate counts were dropped from the standard protocol in 2011.

Table 1 (continued). Core Species, Higher Taxa, and Substrata Scored in Photoplots, Point Intercept Transects, Circular Plots, Abalone/Seastars, and Mobile Invertebrate Counts at all CINP Sites.

| (Target species are shown in bold.)                                                  | Photoplots | Surfgrass<br>Transects | Circular<br>Plots | Abalone/<br>Sea star | Motile<br>Inverts |
|--------------------------------------------------------------------------------------|------------|------------------------|-------------------|----------------------|-------------------|
| MOLLUSCS                                                                             |            |                        |                   |                      |                   |
| <i>Acanthina</i> spp.                                                                |            |                        |                   |                      | X                 |
| Chitons                                                                              | X          |                        |                   |                      | X                 |
| <i>Fissurella volcano</i>                                                            |            |                        |                   |                      | X                 |
| <b><i>Haliotis cracherodii</i></b> (Black Abalone)                                   |            |                        |                   | X                    |                   |
| <i>Lepidochitona hartwegii</i>                                                       |            |                        |                   |                      | X                 |
| <i>Littorina</i> spp.                                                                |            |                        |                   |                      | X                 |
| <b><i>Lottia gigantea</i></b> (Owl Limpet)                                           |            |                        | X                 |                      | X                 |
| <i>Mopalia</i> spp.                                                                  |            |                        |                   |                      | X                 |
| <b><i>Mytilus californianus</i></b> (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                                                                            |            |                        |                   |                      |                   |
| <b><i>Chthamalus dalli/fissus</i> &amp; <i>Balanus glandula</i></b> (Acorn Barnacle) | X          |                        |                   |                      |                   |
| <b><i>Tetraclita rubescens</i></b> (Thatched Barnacle)                               | X          |                        |                   |                      |                   |
| <b><i>Pollicipes polymerus</i></b> (Goose Barnacle)                                  | X          |                        |                   |                      |                   |
| Barnacles*                                                                           |            | X                      |                   |                      |                   |
| ECHINODERMS                                                                          |            |                        |                   |                      |                   |
| <b><i>Pisaster ochraceus</i></b> (Ochre Star)                                        | X          | X                      |                   | X                    | X                 |
| <i>Pisaster giganteus</i>                                                            |            |                        |                   | X                    | X                 |
| <i>Patiria miniata</i>                                                               |            |                        |                   | X                    | X                 |
| <i>Strongylocentrotus purpuratus</i>                                                 |            |                        |                   |                      | X                 |
| CRUSTACEANS                                                                          |            |                        |                   |                      |                   |
| <i>Pachygrapsus crassipes</i>                                                        |            |                        |                   |                      | X                 |
| <i>Pagurus</i> spp.                                                                  |            |                        |                   |                      | X                 |
| INVERTEBRATES                                                                        |            |                        |                   |                      |                   |
| Other Invertebrates (Other Animals) (any inverts not listed above)*                  | X          | X                      |                   |                      |                   |
| SUBSTRATES                                                                           |            |                        |                   |                      |                   |
| <b>Rock (Bare Rock)</b>                                                              | X          | X                      |                   |                      |                   |
| Sand                                                                                 | X          | X                      |                   |                      |                   |
| <b>Tar</b>                                                                           | X          | X                      |                   |                      |                   |
| Unidentified (cannot tell if plant, invert or substratum)                            | X          | X                      |                   |                      |                   |

\* Motile Invertebrate counts were dropped from the standard protocol in 2011.

In 2012, all photoplots were photographed with a digital camera (Olympus 1030 SW). 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 in rare cases in the office from digital images of the plots, when conditions were unfavorable or there was insufficient time. 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, transcribed into the computer database and 100% reviewed for errors.



Figure 2. Photograph of Stephen Whitaker scoring photoplots at Anacapa Middle West.

Relative abundance and size structure data were collected for black abalone at each site by searching a defined area of the reef or by utilizing a timed-interval search. The sites vary in size and natural breaks in the reef defined the areas, facilitating repeated searches of similar area. Timed searches are typically 30-minutes long. More time is often devoted to searches at sites that have the greatest numbers of abalone (e.g., Otter Harbor, San Miguel Island and Willows Anchorage, Santa Cruz Island). These protocols were implemented in response to the decline of abalone population levels. Prior to the effects of Withering Syndrom (WS), black abalone were counted and measured in fixed-irregular plots (5 plots per site) at 11 sites. Fixed plots were used when abalone were abundant and often too numerous to count and measure over the whole reef. The fixed plots became inadequate for sampling, however, by the early 1990s as abalone disappeared. Fixed plots are still checked for comparison to early samples, but abalone are rarely encountered in the plots.

During the timed or defined-area searches for black abalone, typically one observer searches for individuals by carefully inspecting crevices and cavities among boulders and checking under kelp or other canopy-forming seaweeds. Abalone are identified to species, shell lengths are measured with vernier calipers or estimated if an accurate measurement is not possible, and the nearest neighbor distance is recorded using five spatially-descriptive categories (touching, < 10 cm, 10-100 cm, 1-5 m, >5 m). Aggregation sizes (number of abalone within one meter of another) are generally noted as well. Shell size serves as a proxy for age, and thus provides a glimpse of the population structure. Nearest neighbor distance and aggregation size provide insight to the theory that abalone aggregate naturally. The information may also serve as an indication of spawning potential, since, as broadcast spawners, black abalone reproductive options increase with proximity to other individuals.

*Lottia gigantea*, giant owl limpet, abundance and size structure were assessed within fixed, circular plots (3 to 5 plots per site) at 12 sites. Within each plot, an area of 3.14 m<sup>2</sup> delineated by circling a fixed bolt with a pre-measured (1 m in length) line was used to measure and count all owl limpets > 15 mm (< 15 mm limpets can be difficult to identify to species) for maximum shell length (Figure 3).



Figure 3. Stephen Whitaker measuring giant owl limpets and Connie Jenkins recording at Fossil Reef, Santa Rosa Island.

*Pisaster ochraceus*, ochre seastars, were counted along with other species of seastars (*Pisaster giganteus*, *Patiria miniata*, *Pycnopodia helianthoides*, and *Leptasterias hexactis*) in a general search of the reef (for 30-minutes). When possible (time and weather permitting), 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 (2m x ~8m) were used as a rough measure of density within that area.

From 2002 to 2011, smaller motile invertebrates (Table 1) were counted by carefully searching each photoplot. 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 photoplot area. Motile-invertebrates were usually sampled once annually.

*Phyllospadix* spp., surfgrass, 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. Surfgrass transect scoring methods follow the MARINE protocol, adding *Phyllospadix* spp. understory for surfgrass covered by algae.

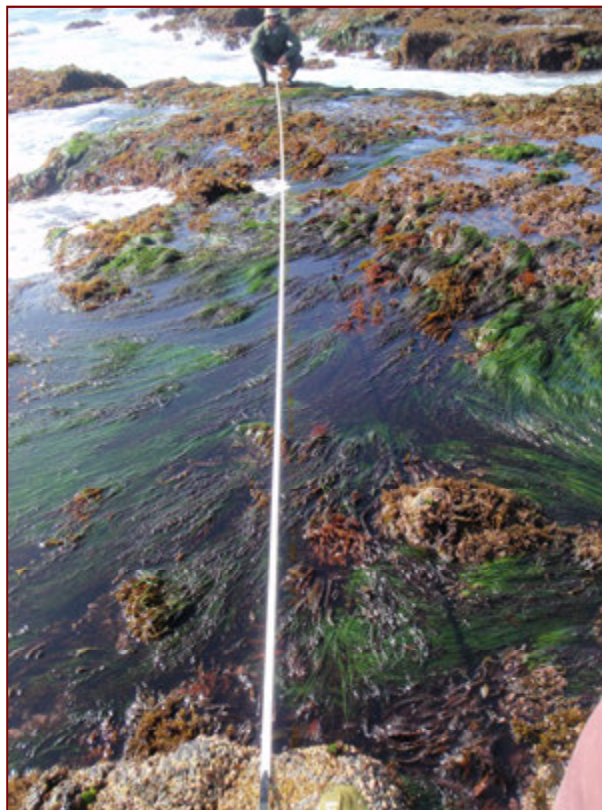


Figure 4. Photograph of surfgrass transect at Trailer, Santa Cruz Island.

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. Concessionaires (Island Packers Company and Truth Aquatics) reported numbers of visitors to the park. No independent counts of visitors were made to verify reported figures.

Fieldwork 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 during dark

hours. Sampling dates for spring and fall seasons were chosen for minus tide series occurring during daylight hours. Dan Richards and Stephen Whitaker conducted sampling with assistance from others for data recording and sea star counts. Notes regarding sampling variations, personnel changes, and equipment are documented in trip reports in Appendix C.

Optic Stowaway temperature loggers from Onset Computer Corporation were placed in PVC (Polyvinyl Chloride) pipe housings and fixed with epoxy to rocks near the mean-tide line. Units were downloaded in the field to an Optic Shuttle device and processed with Onset's Boxcar software.

Taxonomy and nomenclature follow Smith and Carlton (1975), Carlton (2007), Abbott and Hollenberg (1976), McLean (1978), Morris et al. (1980), and [http://ucjeps.berkeley.edu/californiaseaweeds\\_refs.html](http://ucjeps.berkeley.edu/californiaseaweeds_refs.html). Note that in this report, we have adopted the taxonomy of Carlton (2007) with the genus name change from *Tegula* to *Chlorostoma* for turban snails.

### **Data Analysis**

The purpose of this report is to present data collected in 2012. Advanced statistical analyses on the data have 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 photoplots (acorn barnacles, thatched barnacles, mussels, rockweeds [*Silvetia* and *Hesperophycus*], goose barnacles, red algal turf, and tar) using JMP (2012) and or Tercek Data Analyzer Tool. These graphs provide a quick view of the cover by season compared to the overall range and mean of values through time for each taxa at each site. To minimize variability, photoplot 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), averaged by site were determined for all circular owl-limpet plots, and the trend through time was graphed by sampling event. Readers are cautioned that although abundances are provided for comparative purposes, plots were chosen within high density areas, were not randomly placed, and should not be considered to be representative of larger areas. Surfgrass trends were plotted for temporal reference.

Photoplots, circular plots, and line transects were all "fixed" or measured in the same location every season. It is not possible to extrapolate trends in the plots to entire sites without using additional information specific to the area (Murray *et al.* 2006). Therefore, results from photoplots, transects, and circular plots should be interpreted with care.

## Results and Discussion

### Photoplots

Photoplot data are summarized in Figures 5-6 for each target zone and season. Mean percent cover of target species and other dominant taxa along with bare rock cover are pooled for all replicate plots per zone by site and season. Figures 7-10 display the departure from the long-term mean for each target species pooled across sites at each island.

As in most years, the mean percent cover of nearly all targeted species in 2012 was highly variable among sites. Temporal comparisons between spring and fall sampling seasons indicated that most species, with the minor exception of *Endocladia*, exhibited very little change (Figures 5-6).

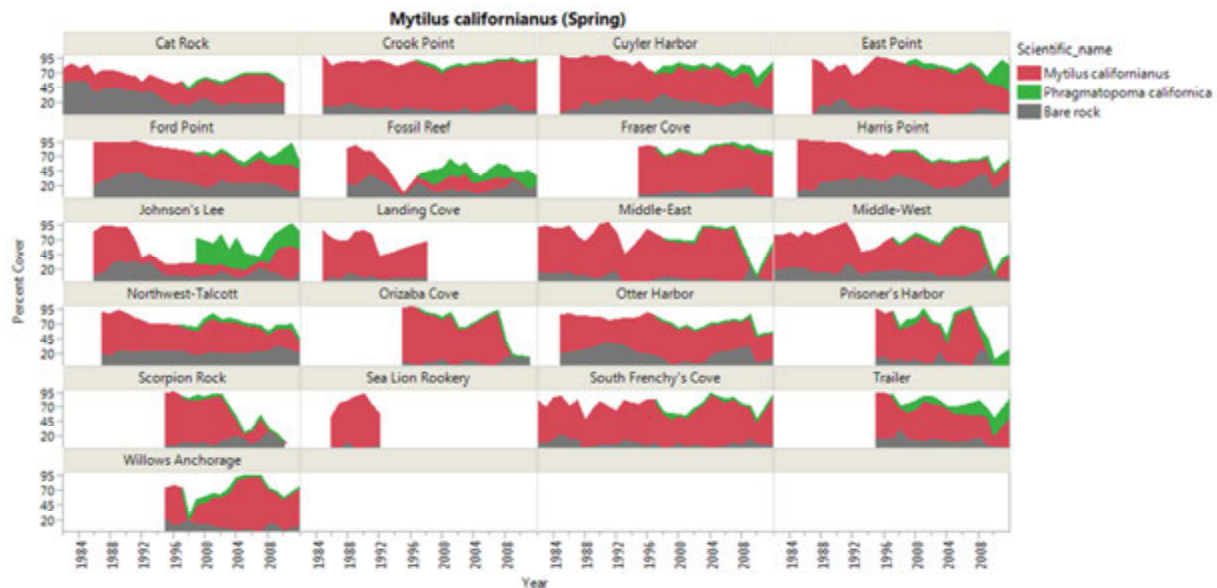


Figure 5. Percent cover of *Mytilus californianus* along with *Phragmatopoma californica* and bare rock in fixed plots within the *Mytilus* zone at each site in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/substrata from replicated (usually five) *Mytilus* plots. Note that Sea Lion Rookery and Landing Cove were not sampled in spring (only fall) after 1992.

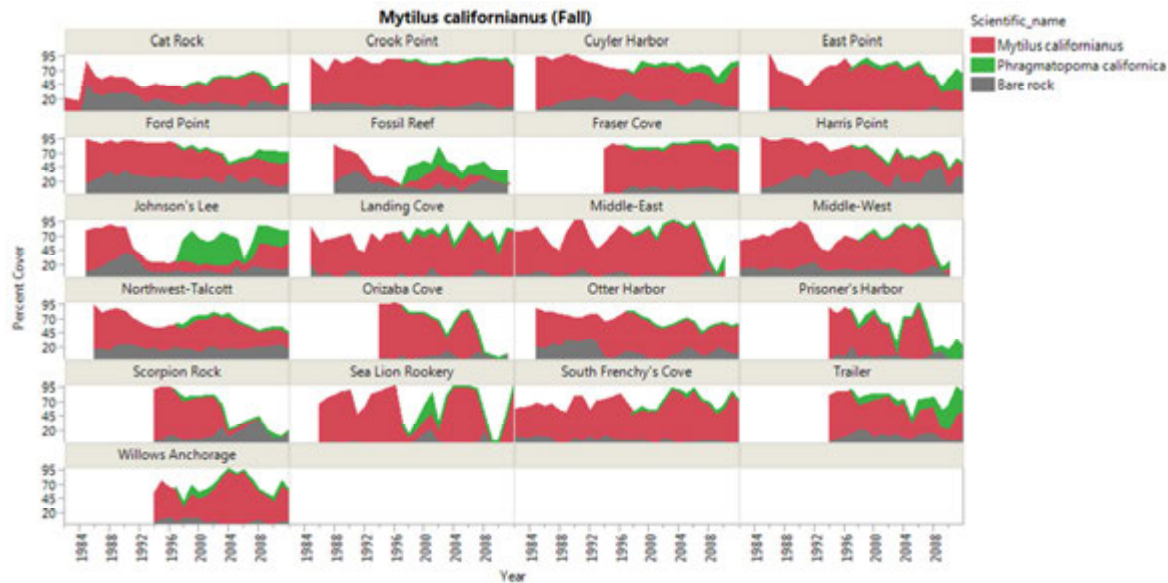


Figure 6. Percent cover of *Mytilus californianus* along with *Phragmatopoma californica* and bare rock in fixed plots within the *Mytilus* zone at each site in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated (usually 5) *Mytilus* plots.

Mussel, *Mytilus californianus* mean percent cover in 2012 remained comparable to the mean of previous years at most sites in spring and fall (Figures 7-11). However, record-low abundances for *M. californianus* were measured at East Point, Prisoner's Harbor and Scorpion Rock. In the case of the latter two sites which both occur on Santa Cruz Island, mussels plummeted to near zero percent cover. Overall at Santa Cruz, mussel cover decreased markedly in 2012 from the long-term mean (Figure 9). The same is true for mussel cover at sites on Santa Rosa Island (Figure 11).

*M. californianus* percentages were only slightly below average at San Miguel Island this year compared to previous years. At Anacapa and particularly Santa Barbara Island, mussels increased above the mean of earlier years. Sites on both of these islands historically have exhibited wide shifts in *M. californianus* abundances from dense coverage to near absence and vice versa. At most sites with few exceptions, mussel plots have been and remain populated with moderate to high cover of *M. californianus* and relatively low cover of *Phragmatopoma* among other species.

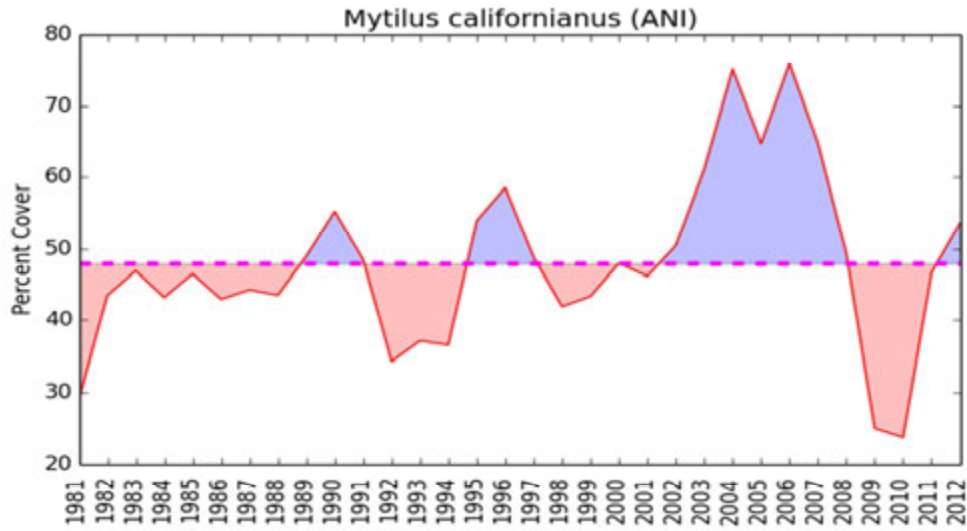


Figure 7. Departure from the long-term mean for *Mytilus californianus* at Anacapa Island. Shaded areas represent mean cover of *M. californianus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

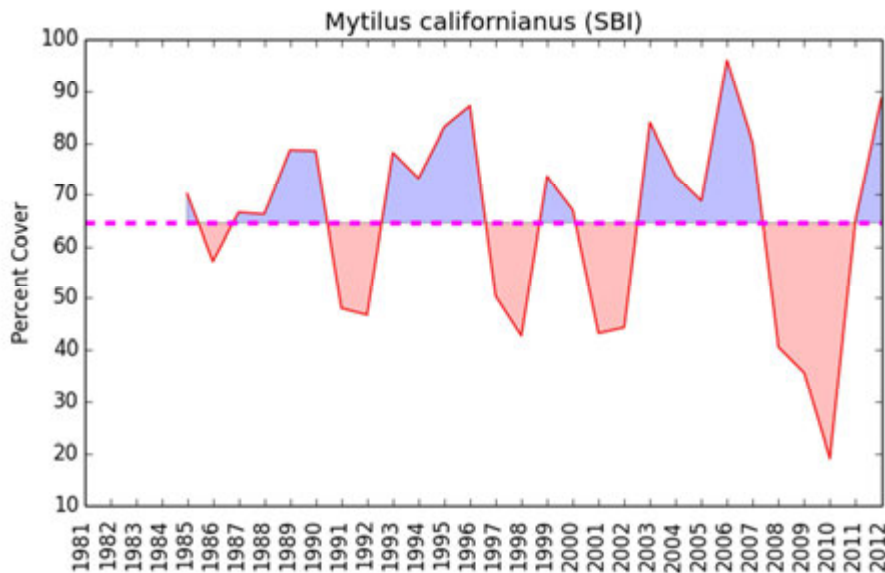


Figure 8. Departure from the long-term mean for *Mytilus californianus* at Santa Barbara Island. Shaded areas represent mean cover of *M. californianus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

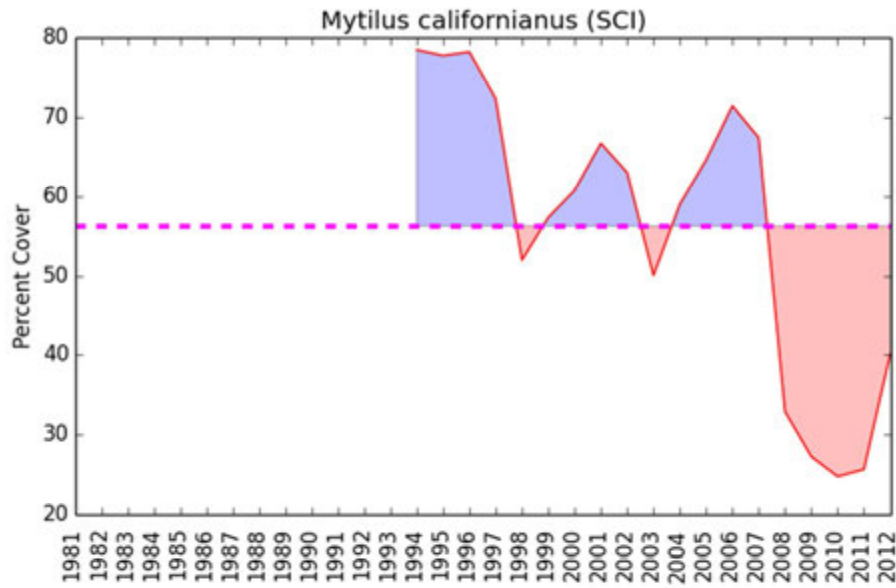


Figure 9. Departure from the long-term mean for *Mytilus californianus* at Santa Cruz Island. Shaded areas represent mean cover of *M. californianus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

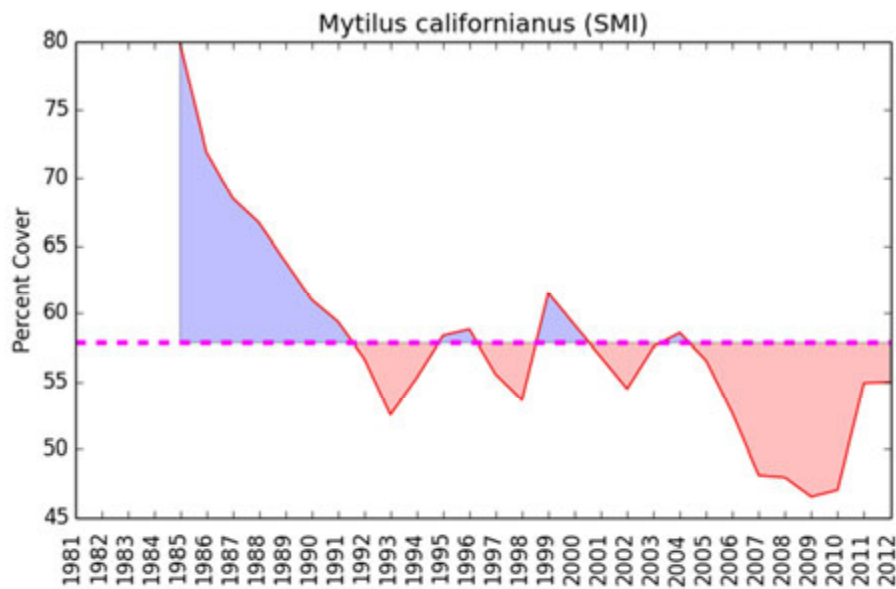


Figure 10. Departure from the long-term mean for *Mytilus californianus* at San Miguel Island. Shaded areas represent mean cover of *M. californianus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

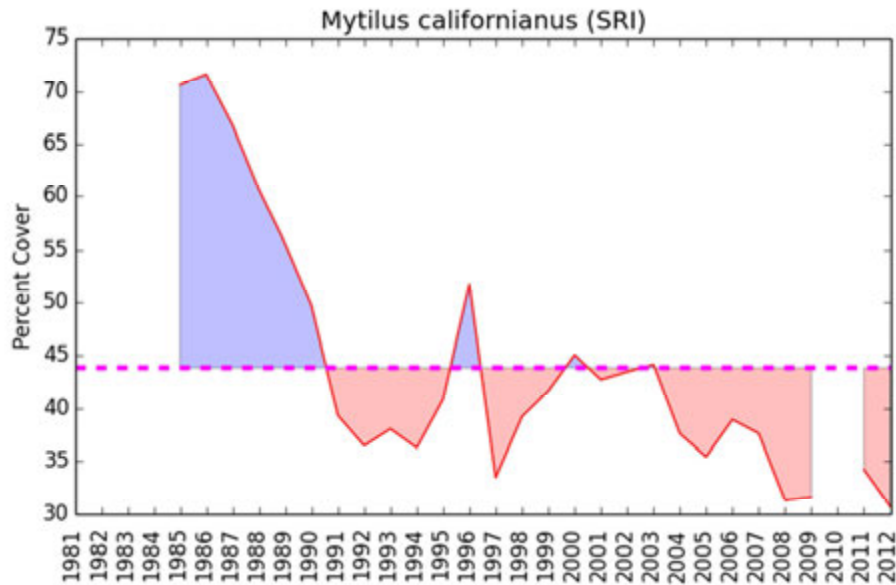


Figure 11. Departure from the long-term mean for *Mytilus californianus* at Santa Rosa Island. Shaded areas represent mean cover of *M. californianus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Rockweed, *Silvetia compressa*, abundances were very low in 2012 compared to previous years. *S. compressa* cover averaged across representative plots at each site was well below long-term averages and measured < 20% absolute cover at nearly all sites (9 of 13 sites) sampled in spring and fall (Figures 12-13). Most sites exhibited marked declines in *S. compressa* abundances beginning in 2005-2006 with little recovery observed for the rockweed through 2012. When pooled across sites, *S. compressa* cover at each island was markedly lower than the long-term averages for those locations (Figure 14-18). At most sites, plots have been dominated primarily by *S. compressa* and other less common species such as *Chthamalus/Balanus* and *Endocladia*.

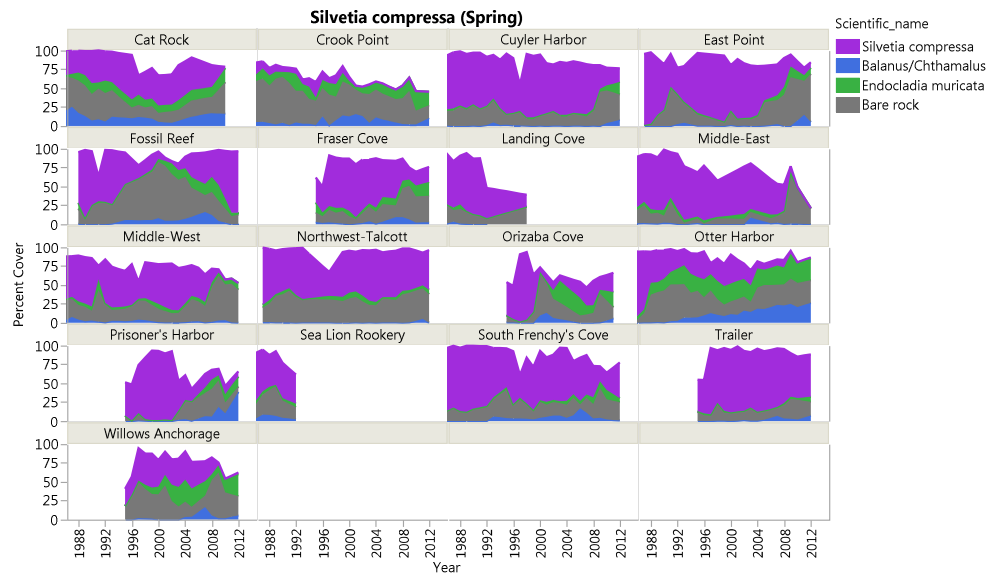


Figure 12. Percent cover of *Silvetia compressa* along with other dominant taxa and bare rock in fixed plots within the *Silvetia* zone at each site in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated (usually five) *Silvetia* plots. Note that Sea Lion Rookery was not sampled in spring (only fall) after 1992.

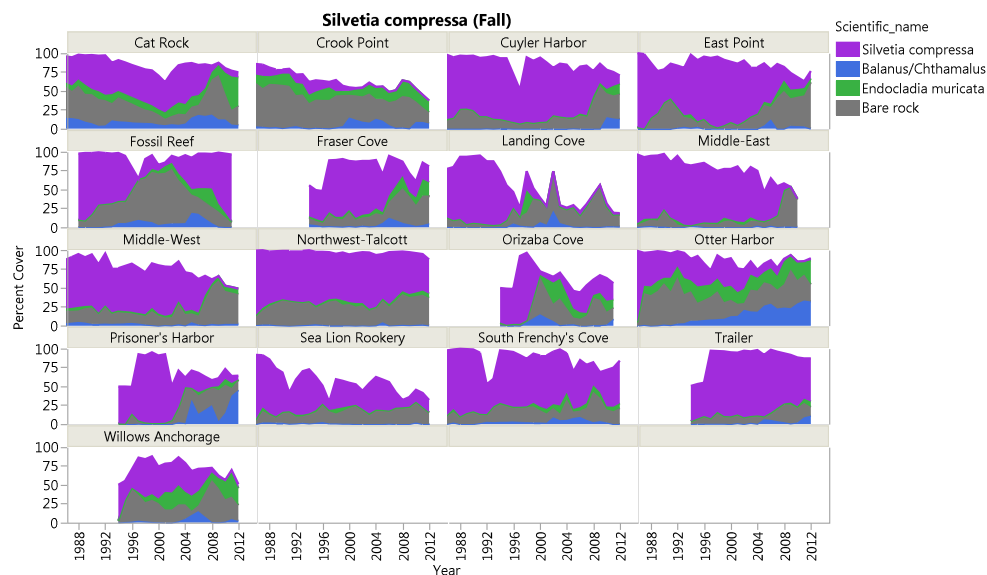


Figure 13. Percent cover of *Silvetia compressa* along with other dominant taxa and bare rock in fixed plots within the *Silvetia* zone at each site in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated (usually five) *Silvetia* plots.

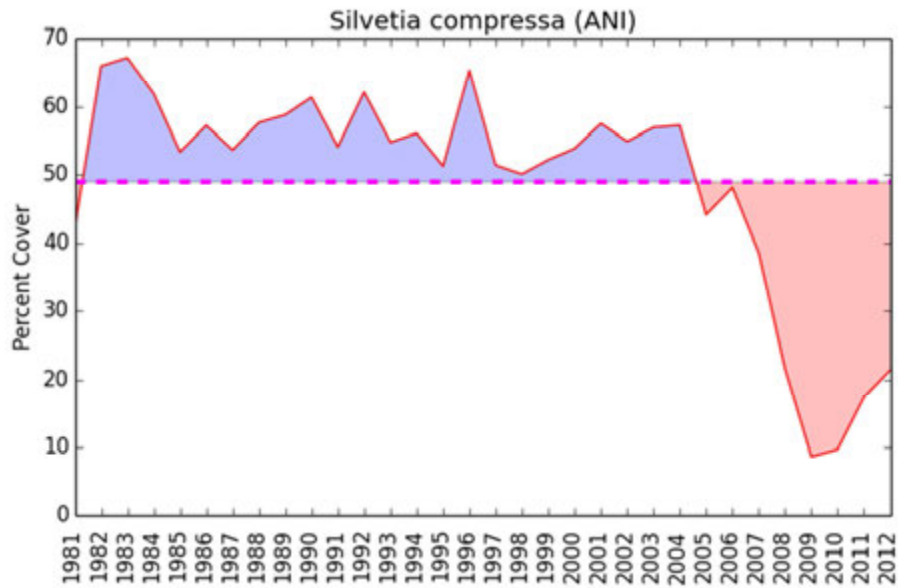


Figure 14. Departure from the long-term mean for *Silvetia compressa* at Anacapa Island. Shaded areas represent mean cover of *S. compressa* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

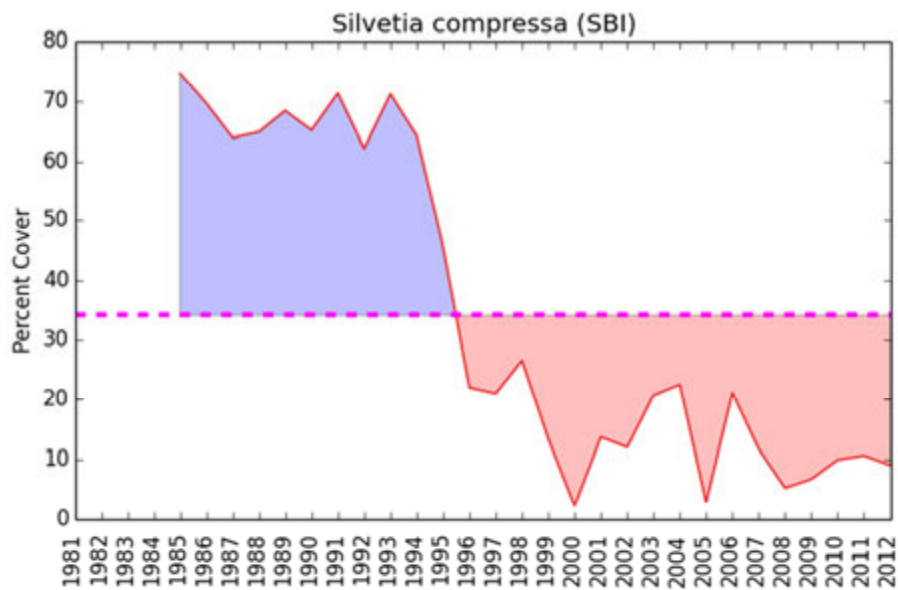


Figure 15. Departure from the long-term mean for *Silvetia compressa* at Santa Barbara Island. Shaded areas represent mean cover of *S. compressa* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

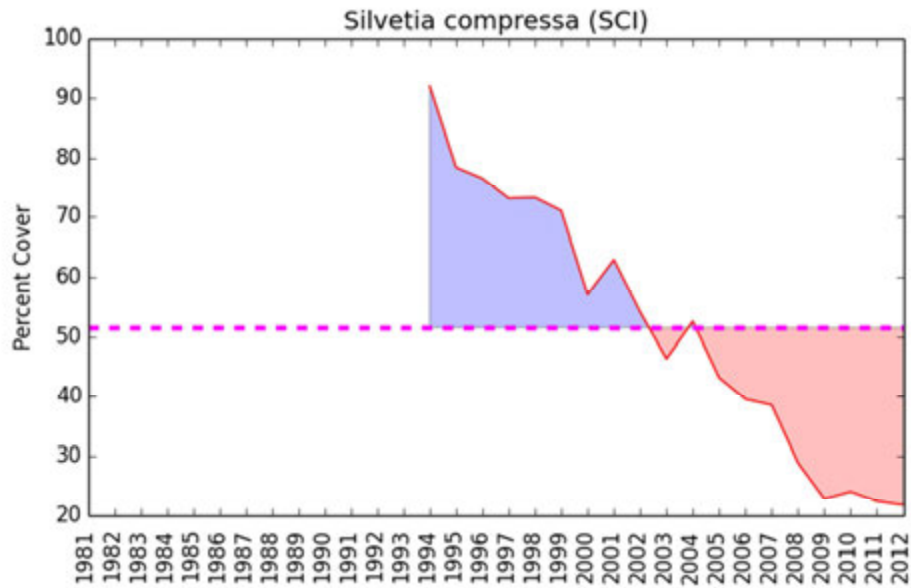


Figure 16. Departure from the long-term mean for *Silvetia compressa* at Santa Cruz Island. Shaded areas represent mean cover of *S. compressa* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

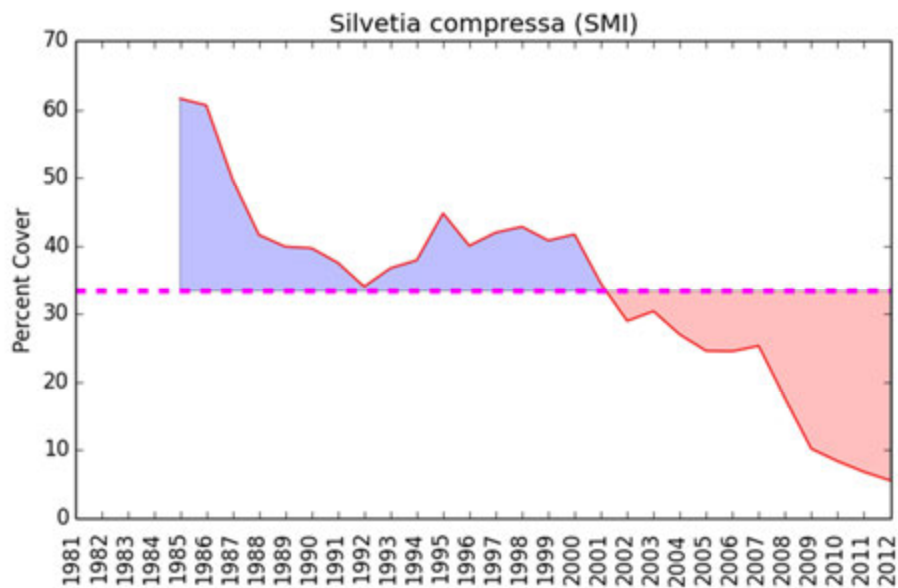


Figure 17. Departure from the long-term mean for *Silvetia compressa* at San Miguel Island. Shaded areas represent mean cover of *S. compressa* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

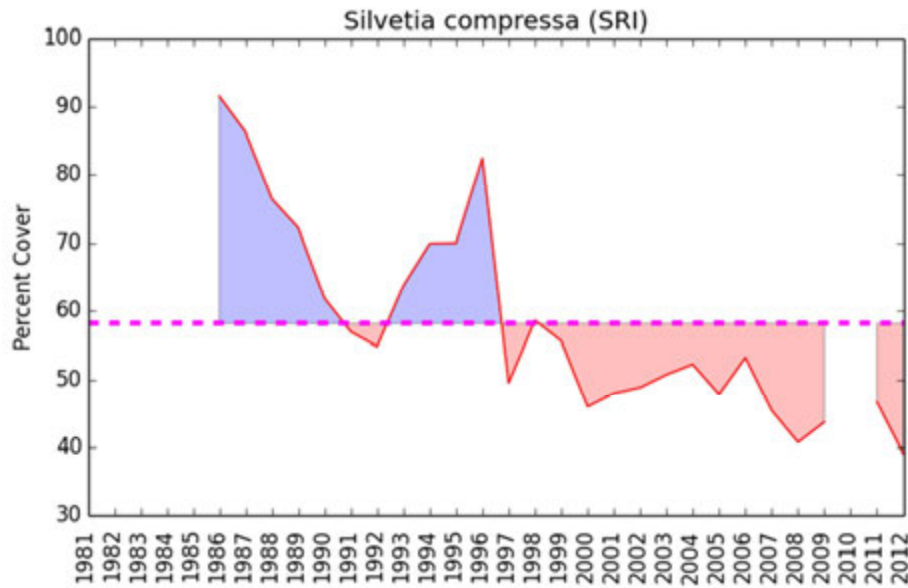


Figure 18. Departure from the long-term mean for *Silvetia compressa* at Santa Rosa Island. Shaded areas represent mean cover of *S. compressa* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

The other rockweed, *Hesperophycus californicus* that occurs in the region, also declined or remained low in abundance at several monitoring sites (Figures 19-20). *H. californicus* cover was lower in 2012 than most years at Prisoner's Harbor and to a lesser degree at Trailer and Willows Anchorage. However, relatively high cover of the rockweed was measured at Fraser Cove, Harris Point and Scorpion Rock. Pooled across sites, *H. californicus* cover measured above the long-term mean at San Miguel and below that of Santa Cruz and Santa Rosa Islands. Over time, plots at most sites have been composed largely of *H. californicus*, *S. compressa*, *E. muricata*, and *Chthamalus/Balanus*.

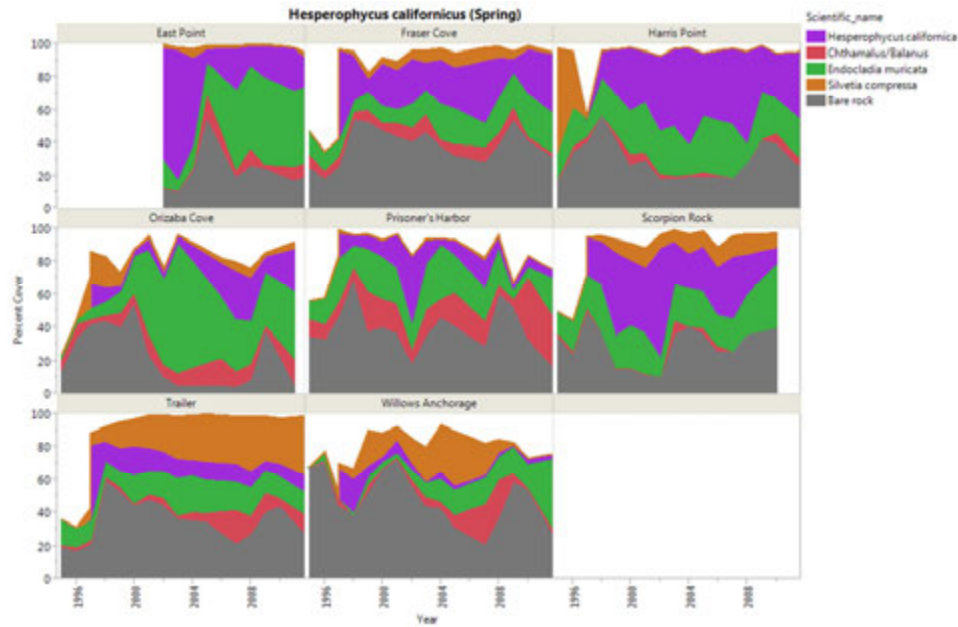


Figure 19. Percent cover of *Hesperophycus californicus* along with other dominant taxa and bare rock in fixed plots within the *Hesperophycus* zone at each site in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Hesperophycus* plots.

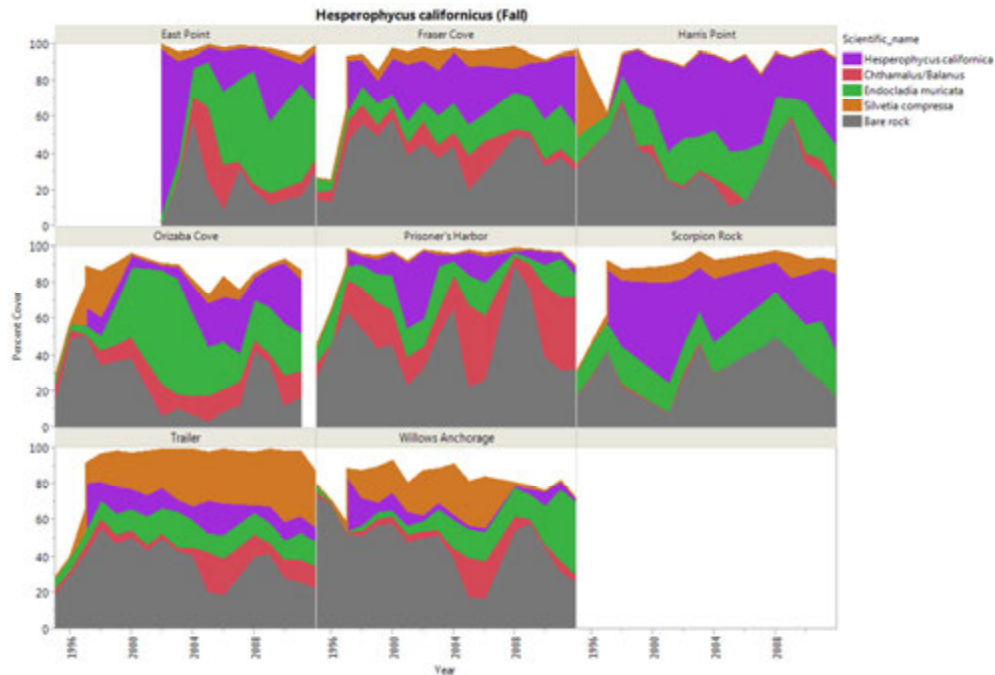


Figure 20. Percent cover of *Hesperophycus californicus* along with other dominant taxa and bare rock in fixed plots within the *Hesperophycus* zone at each site in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Hesperophycus* plots.

*Endocladia muricata* cover in 2012 remained roughly equivalent to mean abundances measured in past years at most sites (Figures 21-22). Exceptions included Johnson's Lee, Anacapa Middle East

and Crook Point which all had relatively low *E. muricata* abundances. In contrast, Fossil Reef, Fraser Cove, South Frenchy's Cove and Scorpion Rock had moderately-high cover of *E. muricata* in 2012 compared to earlier years. Pooled across sites, *E. muricata* abundances were approximately average at the western islands, San Miguel, Santa Rosa and Santa Cruz, and measured above the long-term mean at Anacapa and below that of Santa Barbara Island (Figures 23-27). Other dominant species in *E. muricata* plots have been *S. compressa* and *Chthamalus/ Balanus*.

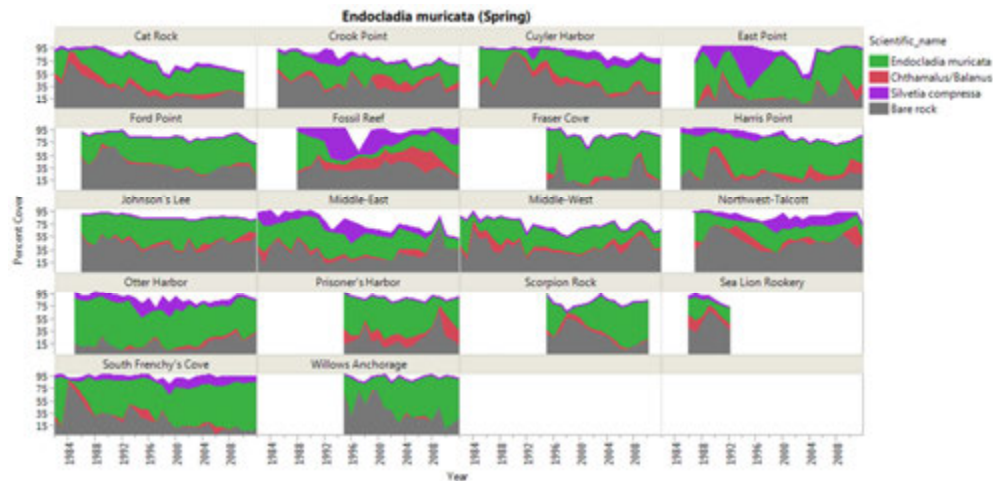


Figure 21. Percent cover of *Endocladia* along with other dominant taxa and bare rock in fixed plots within the *Endocladia* zone at each site in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated (usually five) *Endocladia* plots. Note that Sea Lion Rookery was not sampled in spring (only fall) after 1992.

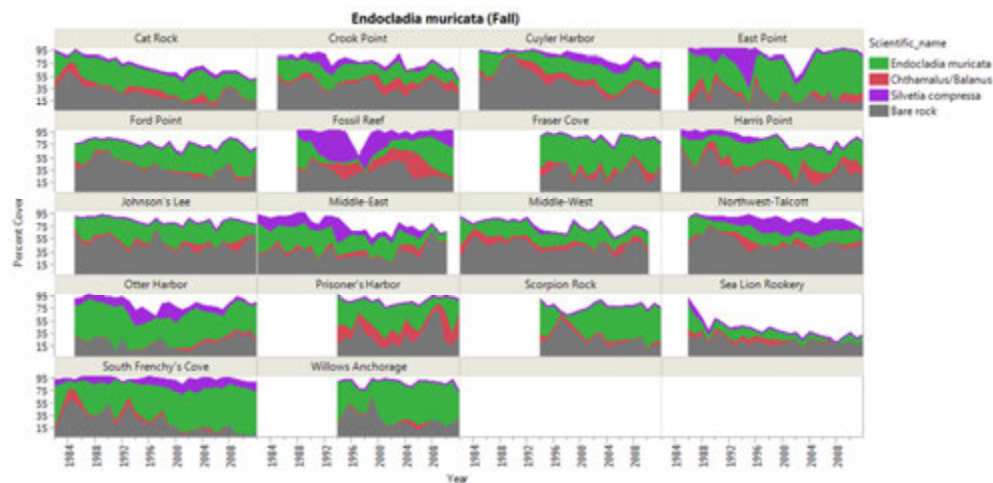


Figure 22. Percent cover of *Endocladia* along with other dominant taxa and bare rock in fixed plots within the *Endocladia* zone at each site in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated (usually five) *Endocladia* plots.

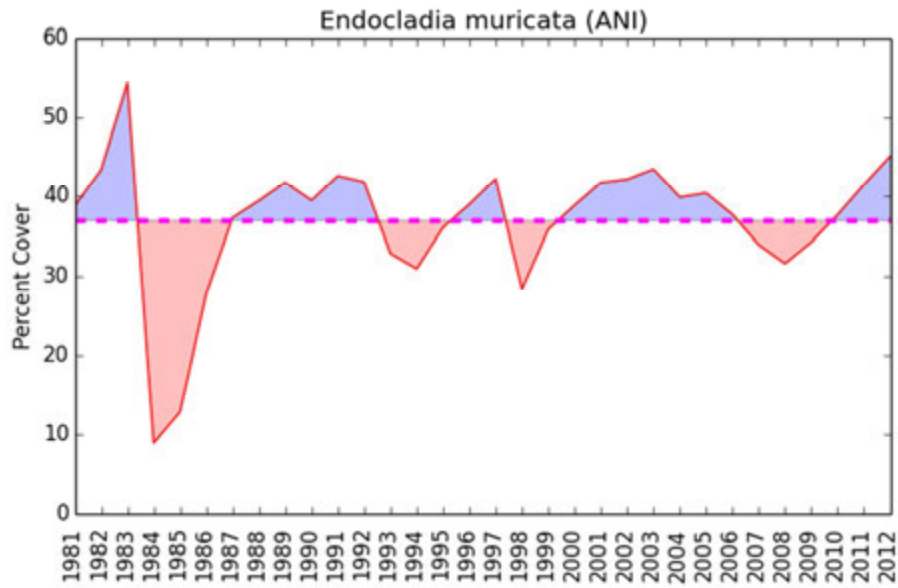


Figure 23. Departure from the long-term mean for *Endocladia muricata* at Anacapa Island. Shaded areas represent mean cover of *E. muricata* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

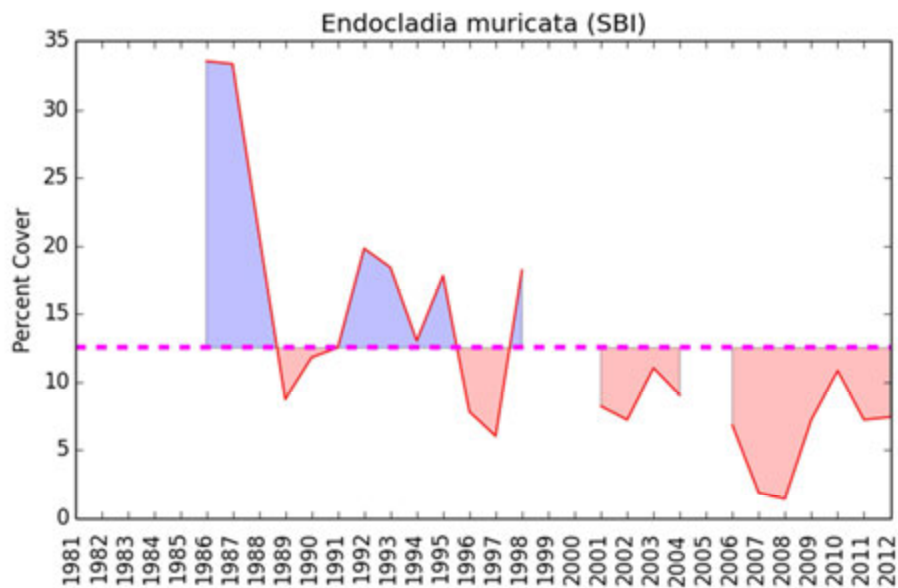


Figure 24. Departure from the long-term mean for *Endocladia muricata* at Santa Barbara Island. Shaded areas represent mean cover of *E. muricata* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

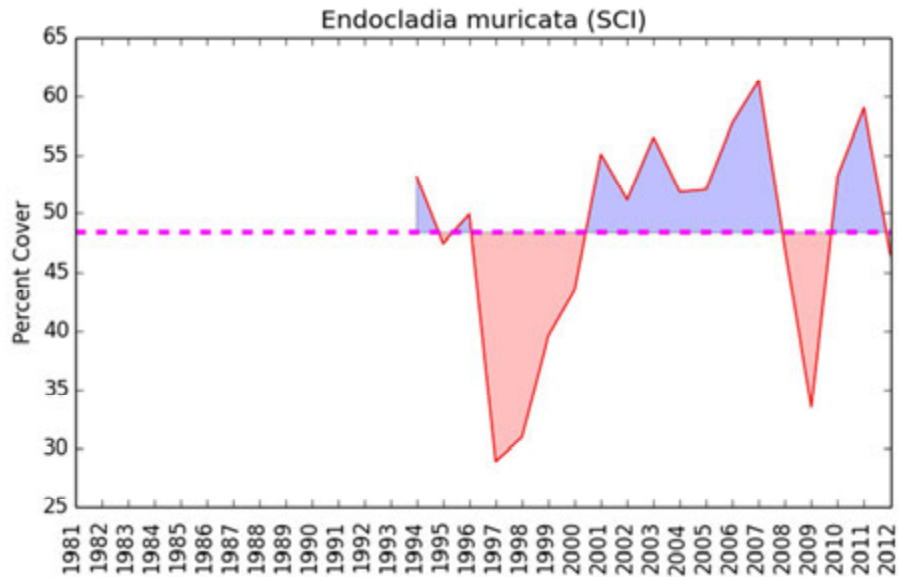


Figure 25. Departure from the long-term mean for *Endocladia muricata* at Santa Cruz Island. Shaded areas represent mean cover of *E. muricata* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

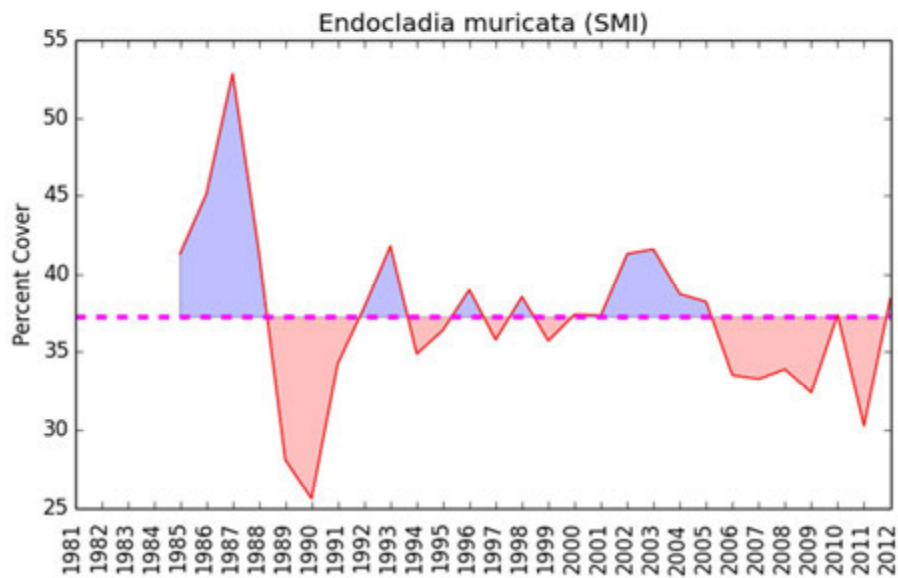


Figure 26. Departure from the long-term mean for *Endocladia muricata* at San Miguel Island. Shaded areas represent mean cover of *E. muricata* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

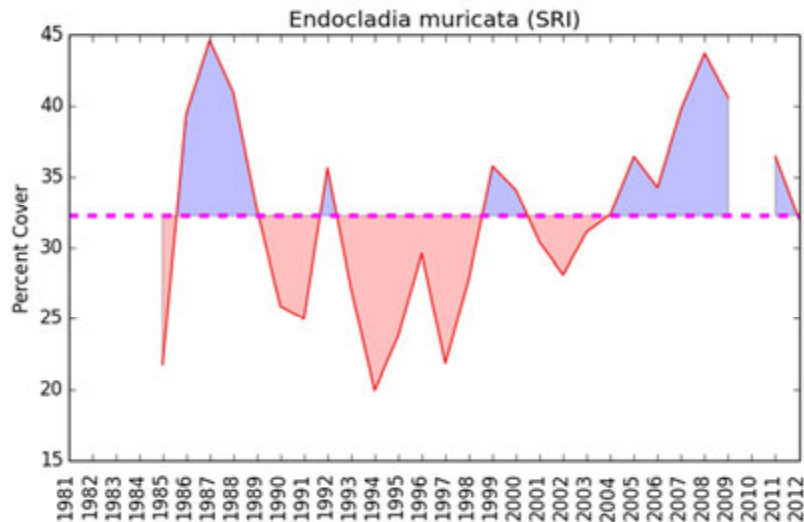


Figure 27. Departure from the long-term mean for *Endocladia muricata* at Santa Rosa Island. Shaded areas represent mean cover of *E. muricata* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Barnacle, *Chthamalus/Balanus* spp. abundances pooled across sites in 2012 fell below the long-term means at Santa Cruz, Anacapa, Santa Barbara, and to a lesser degree at Santa Rosa Island (Figures 28-29). In contrast, at San Miguel, barnacle cover was extremely high in comparison to past years (Figure 33). At the site level, *Chthamalus/Balanus* spp. abundances in 2012 appeared comparable to past years with the exceptions of Landing Cove, Anacapa Middle East, Sea Lion Rookery and South Frenchy's Cove which all had near record-low abundances. Harris Point was the only site that had near record-high abundances of barnacles.



Figure 28. Percent cover of barnacles, *Chthamalus/Balanus*, along with *Endocladia* and bare rock in fixed plots within the barnacle (*Chthamalus/Balanus*) zone at each site in spring. Note that barnacle species were not separated. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from replicated plots (usually five) within the *Chthamalus/Balanus* zone. Landing Cove and Sea Lion Rookery were not sampled in spring during most years.

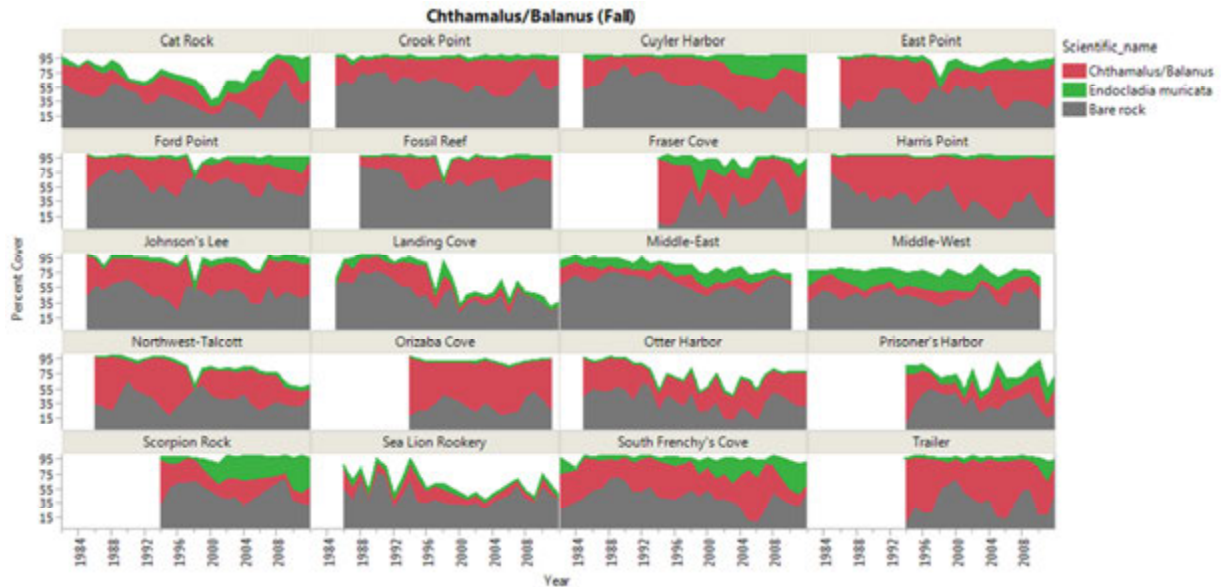


Figure 29. Percent cover of barnacles, *Chthamalus/Balanus*, along with *Endocladia* and bare rock in fixed plots within the barnacle (*Chthamalus/Balanus*) zone at each site in fall. Note that barnacle species were not separated. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/substrata from replicated plots (usually five) within the *Chthamalus/Balanus* zone.

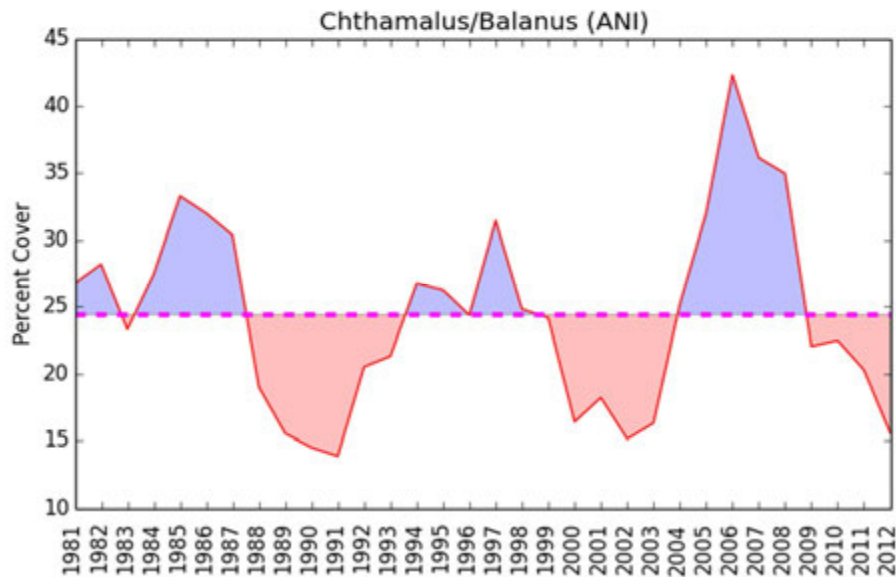


Figure 30. Departure from the long-term mean for *Chthamalus/Balanus* at Anacapa Island. Shaded areas represent mean cover of *Chthamalus/Balanus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

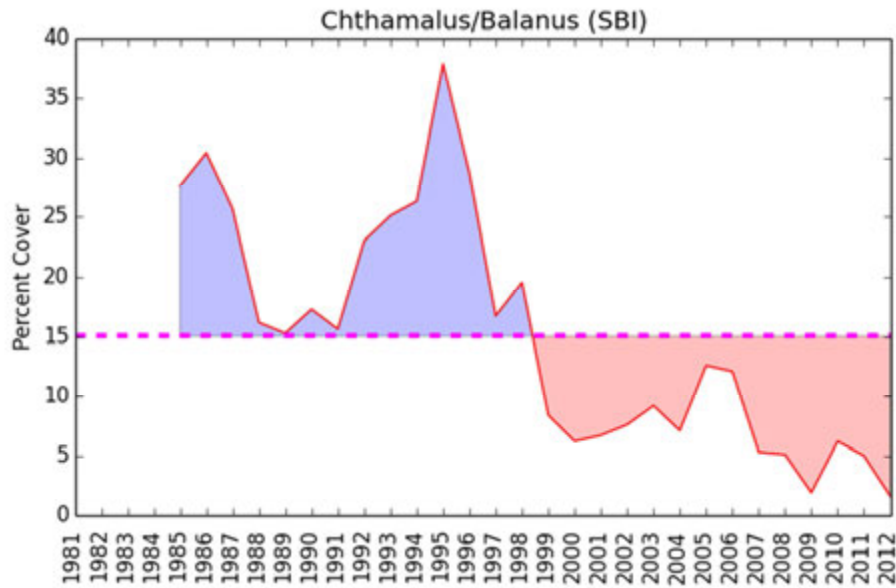


Figure 31. Departure from the long-term mean for *Chthamalus/Balanus* at Santa Barbara Island. Shaded areas represent mean cover of *Chthamalus/Balanus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

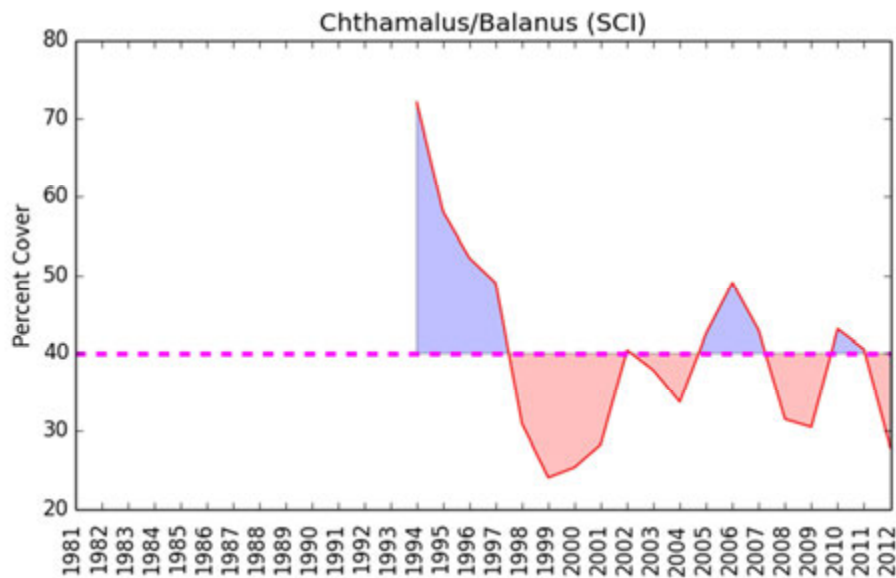


Figure 32. Departure from the long-term mean for *Chthamalus/Balanus* at Santa Cruz Island. Shaded areas represent mean cover of *Chthamalus/Balanus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

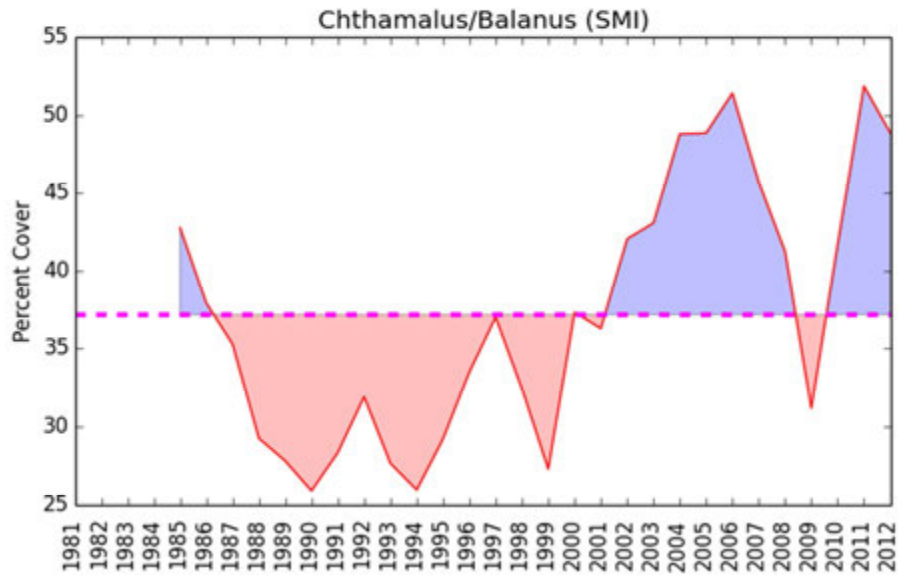


Figure 33. Departure from the long-term mean for *Chthamalus/Balanus* at San Miguel Island. Shaded areas represent mean cover of *Chthamalus/Balanus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

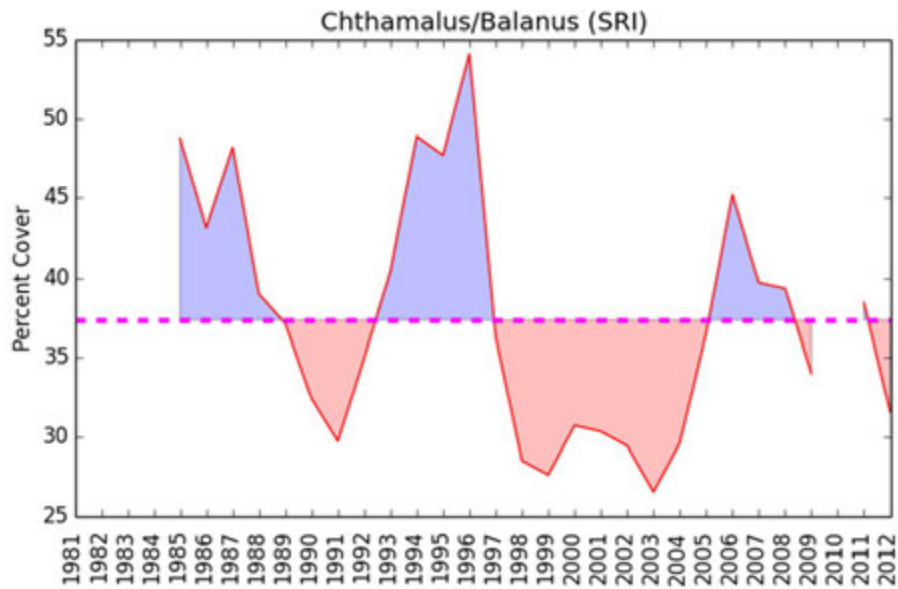


Figure 34. Departure from the long-term mean for *Chthamalus/Balanus* at Santa Rosa Island. Shaded areas represent mean cover of *Chthamalus/Balanus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Red algal turf, composed of *Gelidium* sp., *Pterocladia* sp. and *Chondracanthus canaliculatus* is only monitored at Landing Cove. The 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, yet the surfgrass, *Phyllospadix torreyi*, has increasingly become more established in two of the plots over the past several years. In 2012, the red algal turf plots were dominated by *M. californianus*, *C. canaliculatus*, *Gelidium*/ *Pterocladia*, and other less abundant species such as *P. torreyi* (Figure 35).

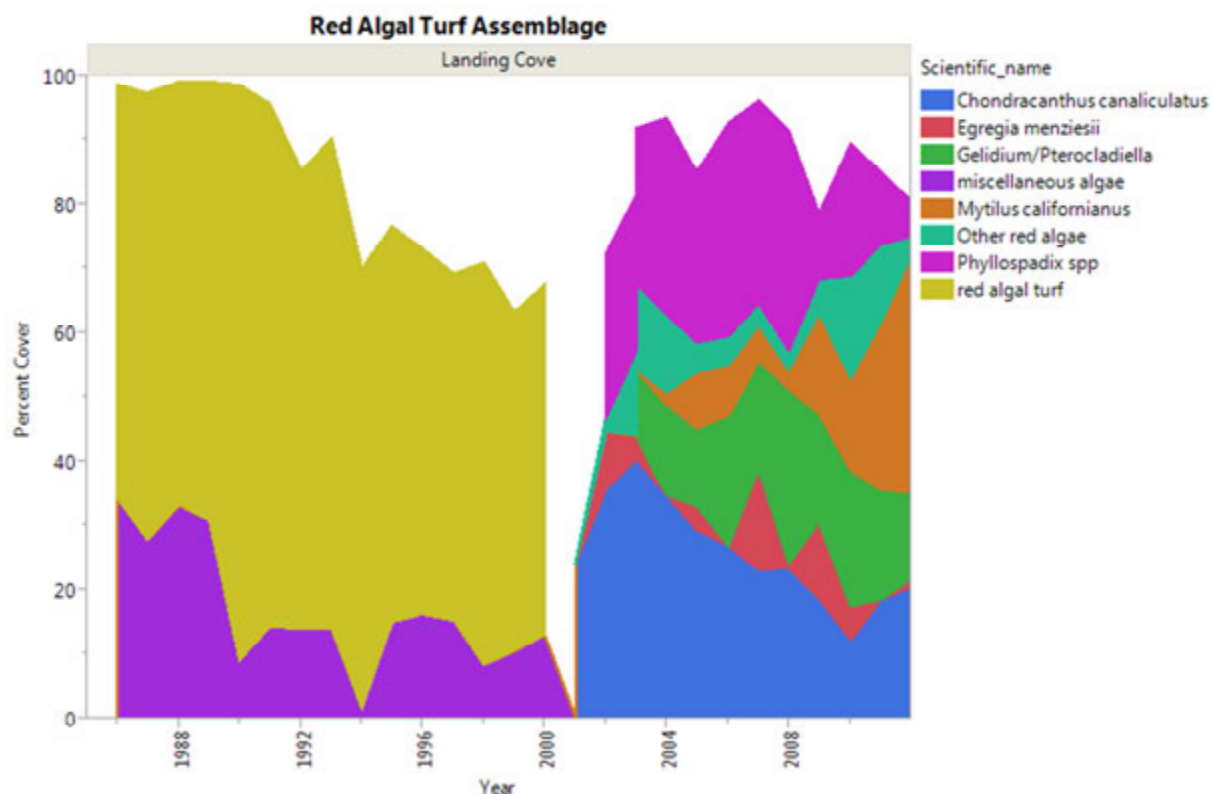


Figure 35. Percent cover of dominant taxa in fixed plots within the red turf assemblage at Landing Cove, Santa Barbara Island. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/substrata from five red turf assemblage plots.

Goose or leaf barnacle, *Pollicipes polymerus* zone plots have only been established at Fraser Cove, where goose barnacle cover has declined slowly over time from approximately 20% to well below 10% by 2009. *P. polymerus* cover increased markedly since 2009 and was slightly above the long-term mean in 2012 (Figures 36-38). Other dominant species in the *P. polymerus* plots have included *M. californianus* and *T. rubescens*.

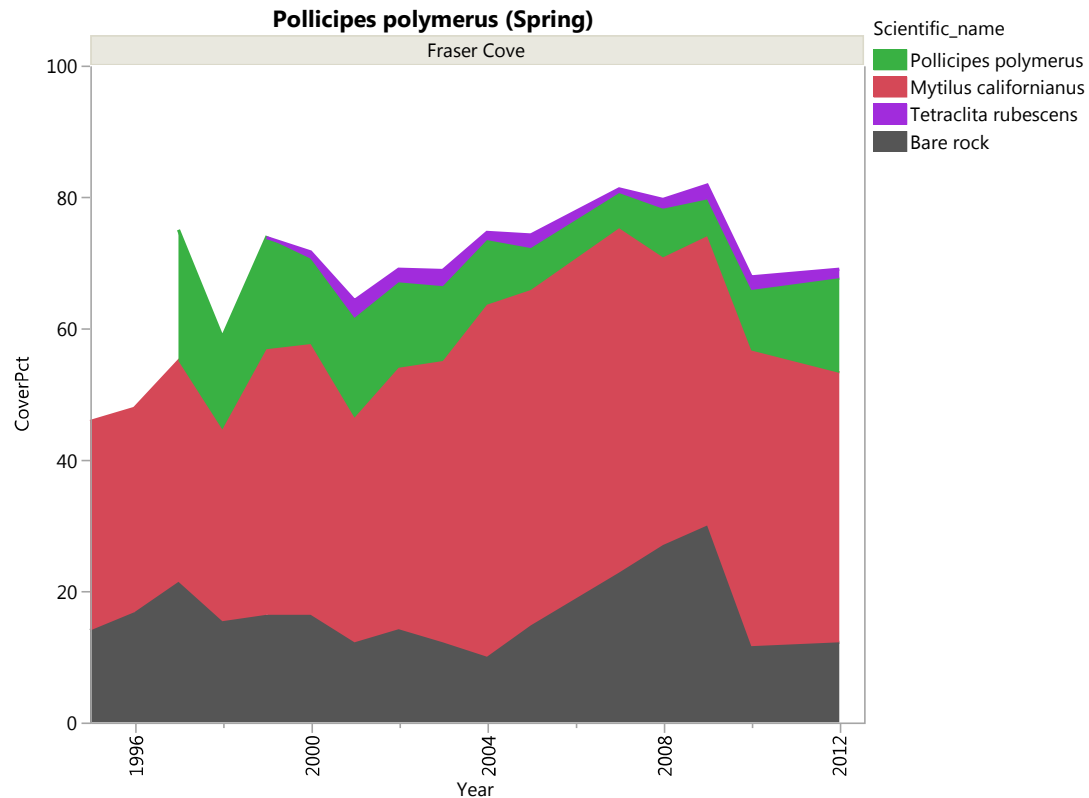


Figure 36. Percent cover of *Pollicipes polymerus* along with other dominant taxa and bare rock in fixed plots within the *Pollicipes* zone at Fraser Cove, Santa Cruz Island in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Pollicipes* plots.

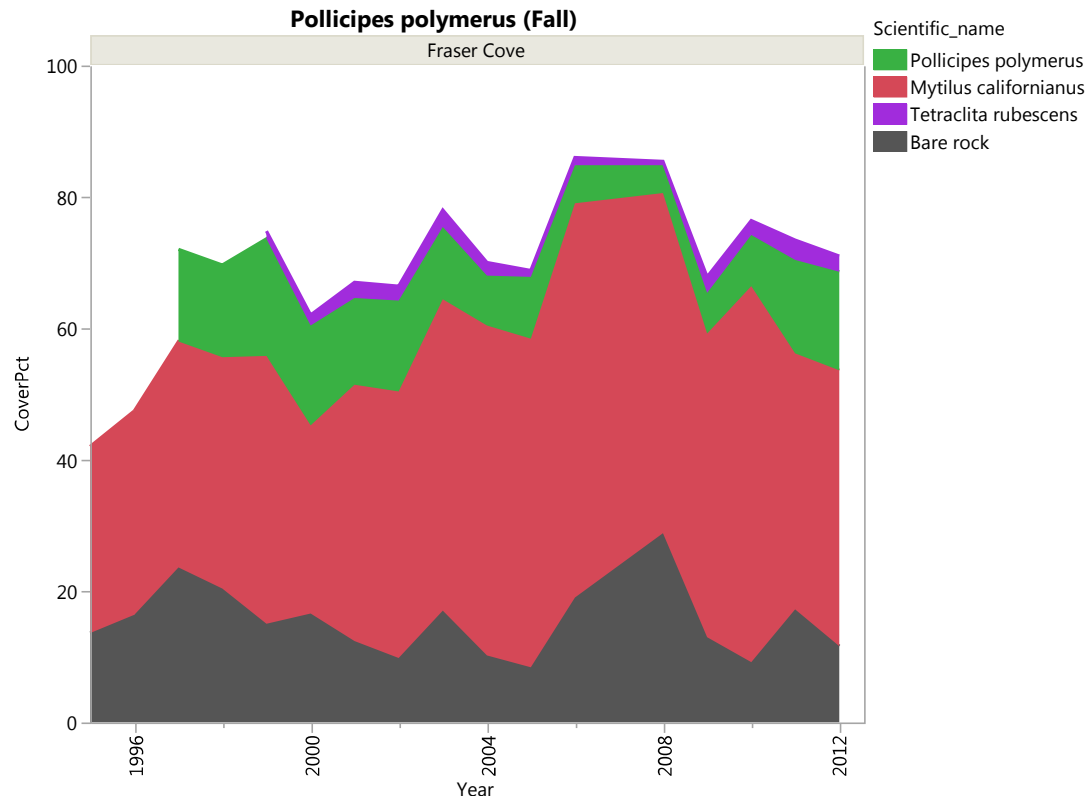


Figure 37. Percent cover of *Pollicipes polymerus* along with other dominant taxa and bare rock in fixed plots within the *Pollicipes* zone at Fraser Cove, Santa Cruz Island in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Pollicipes* plots.

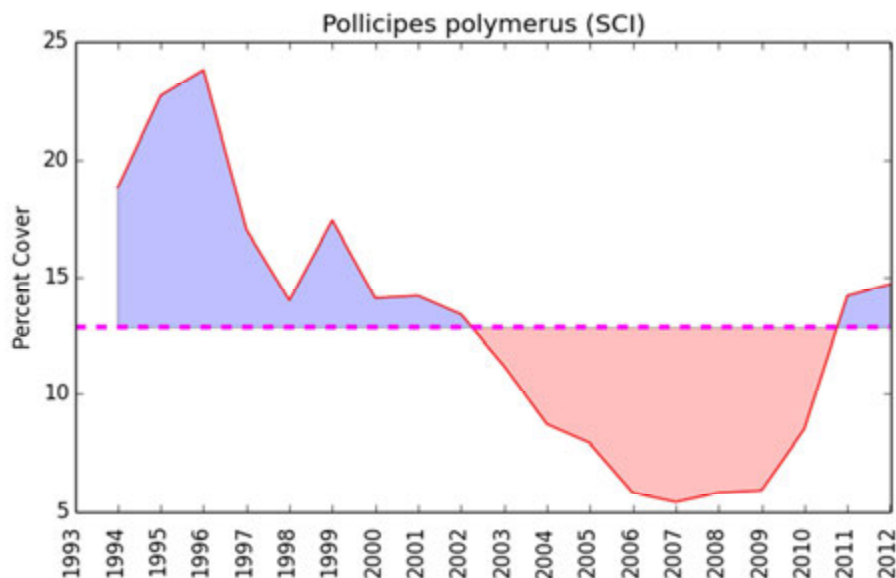


Figure 38. Departure from the long-term mean for *Pollicipes polymerus* at Fraser Cove, Santa Cruz Island. Shaded areas represent mean cover of *P. polymerus* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

The thatched barnacle, *Tetraclita rubescens* is only monitored at three sites (Harris Point, Orizaba Cove and Scorpion Rock). At Harris Point, *T. rubescens* cover fell slightly below the long-term mean (Figures 39-42). In contrast, thatched barnacles increased above the long-term mean overall at Santa Cruz Island, which includes Orizaba Cove and Scorpion Rock. Note however that Orizaba Cove was not sampled in 2012.

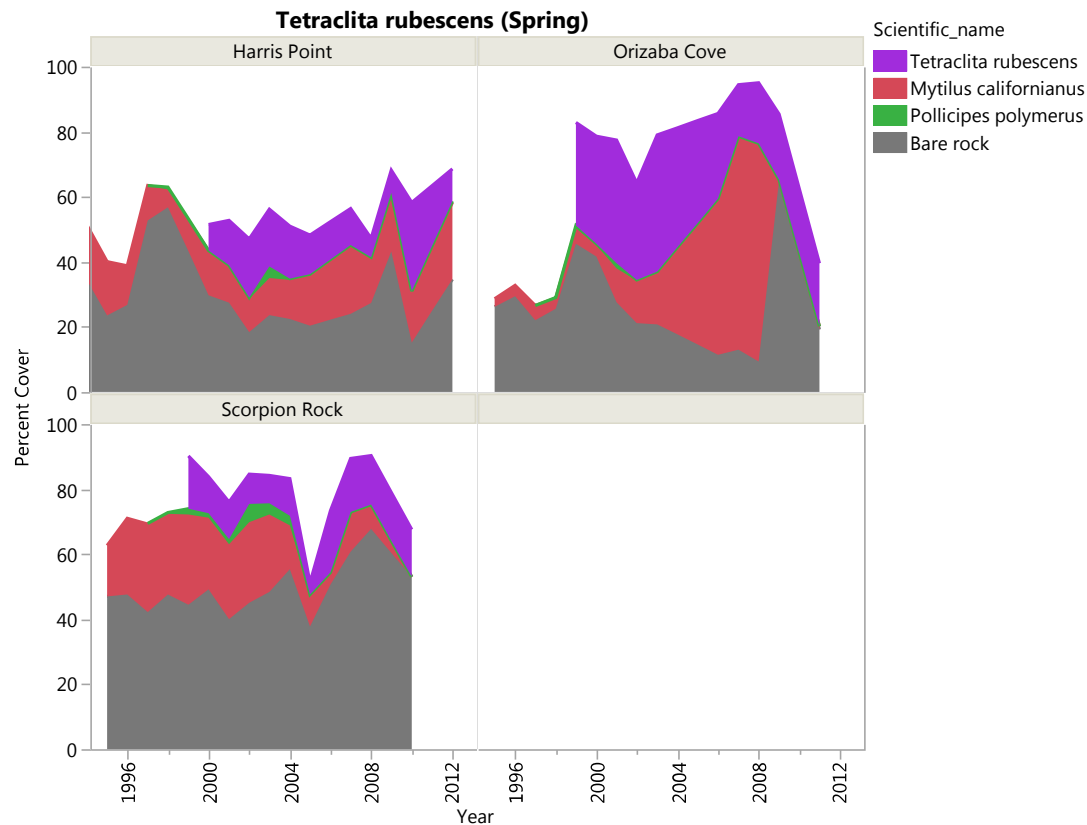


Figure 39. Percent cover of *Tetraclita rubescens* along with other dominant taxa and bare rock in fixed plots within the *Tetraclita* zone at each site in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Tetraclita* plots.

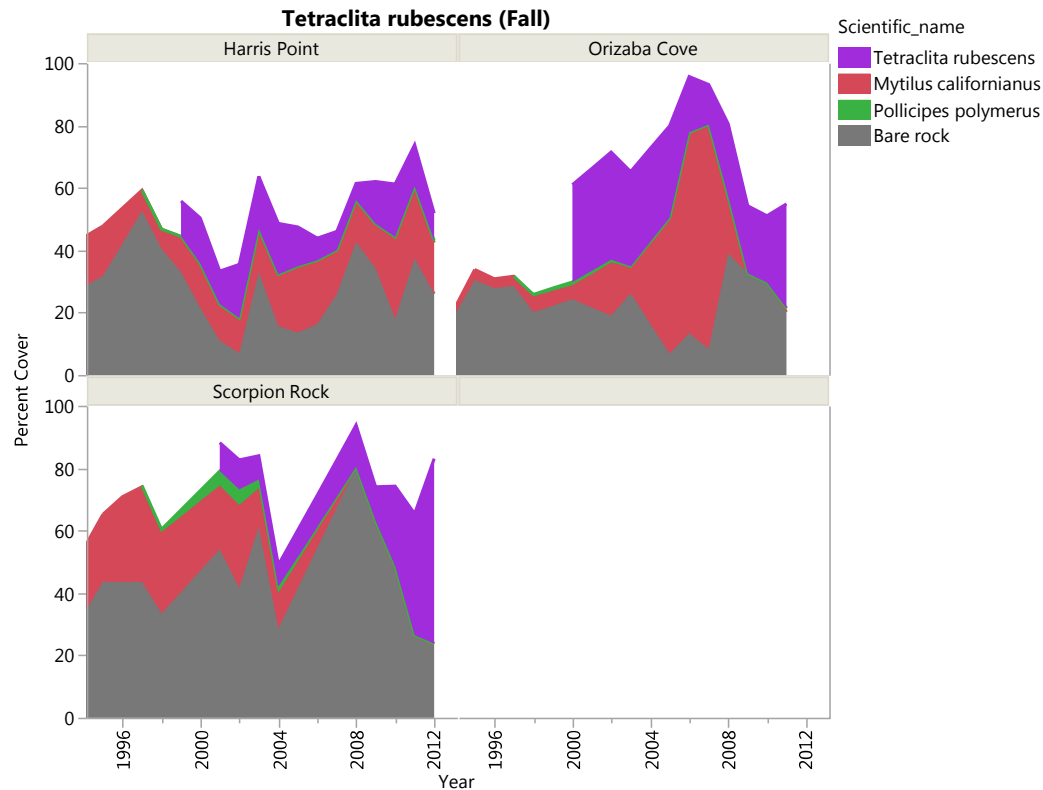


Figure 40. Percent cover of *Tetracrita rubescens* along with other dominant taxa and bare rock in fixed plots within the *Tetracrita* zone at each site in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five *Tetracrita* plots.

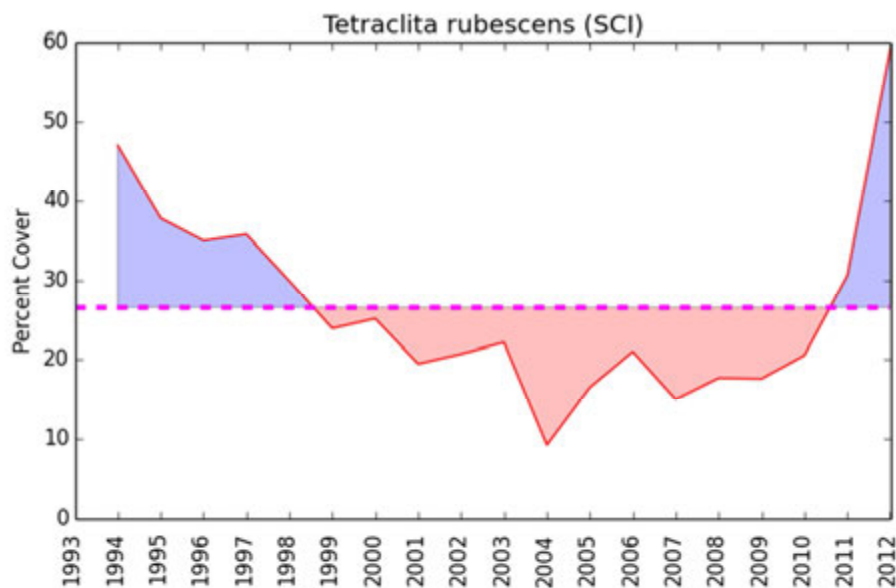


Figure 41. Departure from the long-term mean for *Tetracrita rubescens* at Santa Cruz Island. Shaded areas represent mean cover of *T. rubescens* within the representative zone pooled across plots and sites at each island. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

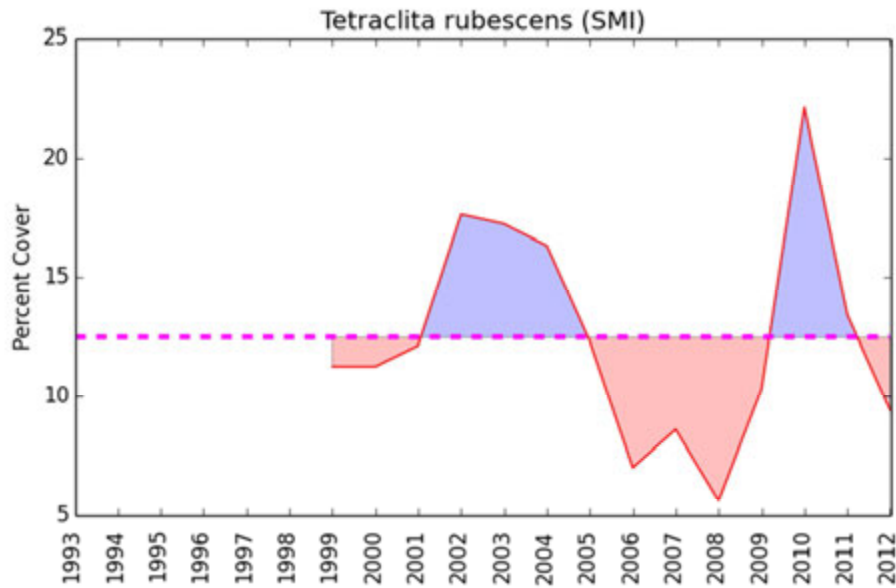


Figure 42. Departure from the long-term mean for *Tetraclita rubescens* at Harris Point, San Miguel Island. Shaded areas represent mean cover of *T. rubescens* within the representative zone pooled across plots. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Tar is only monitored at Fraser Cove where it is naturally deposited from seeps in the Santa Barbara Channel onto extensive stretches of the upper intertidal on the west end of Santa Cruz Island. There was only a slight decline (< 10%) in tar cover in 2012 from the long-term mean (approximately 50%) (Figures 43-45).

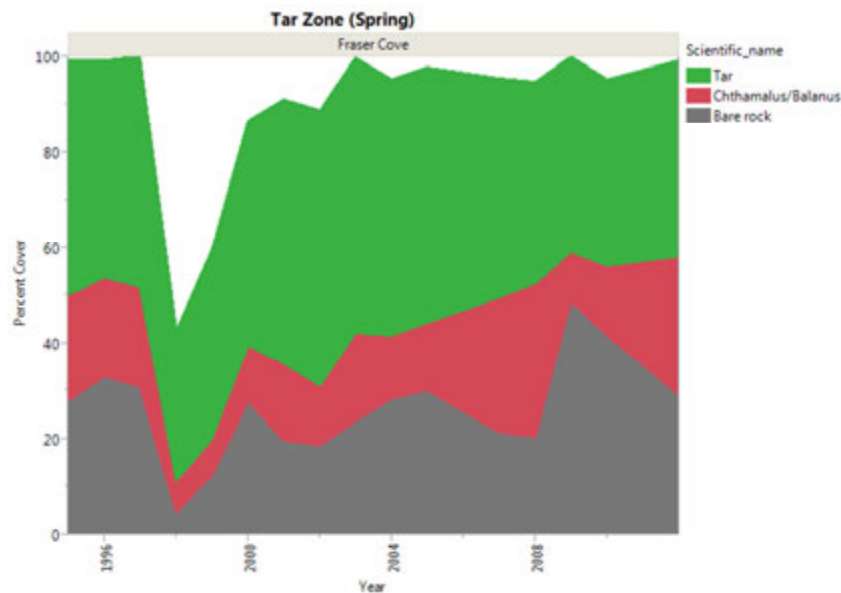


Figure 43. Percent cover of tar along with other dominant taxa and bare rock in fixed plots within the tar zone at Fraser Cove, Santa Cruz Island in spring. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/substrata from five tar plots.

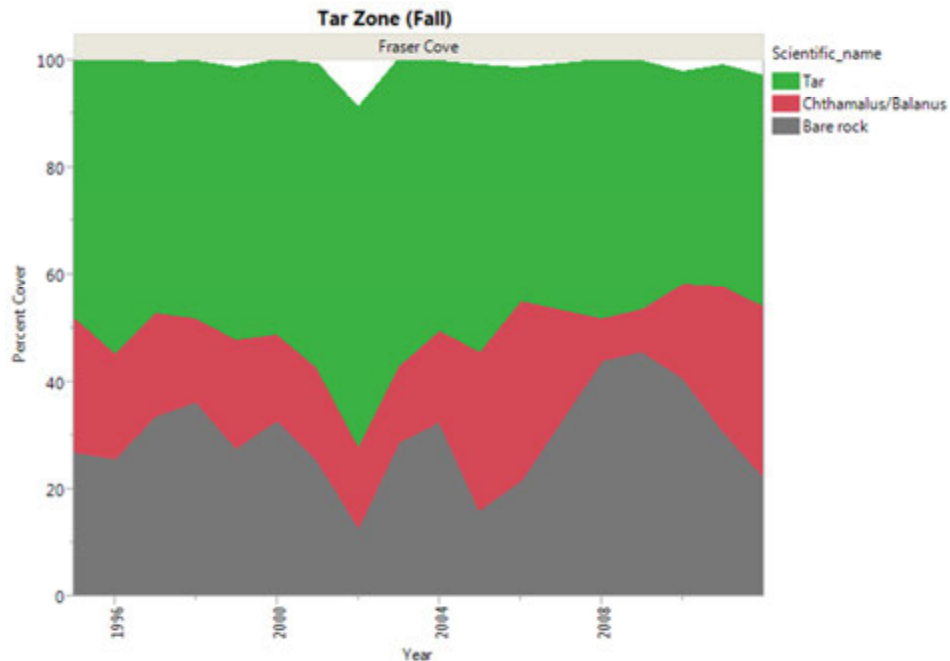


Figure 44. Percent cover of tar along with other dominant taxa and bare rock in fixed plots within the tar zone at Fraser Cove, Santa Cruz Island in fall. Colored areas represent the seasonal mean percent cover for representative and dominant taxa/ substrata from five tar plots.

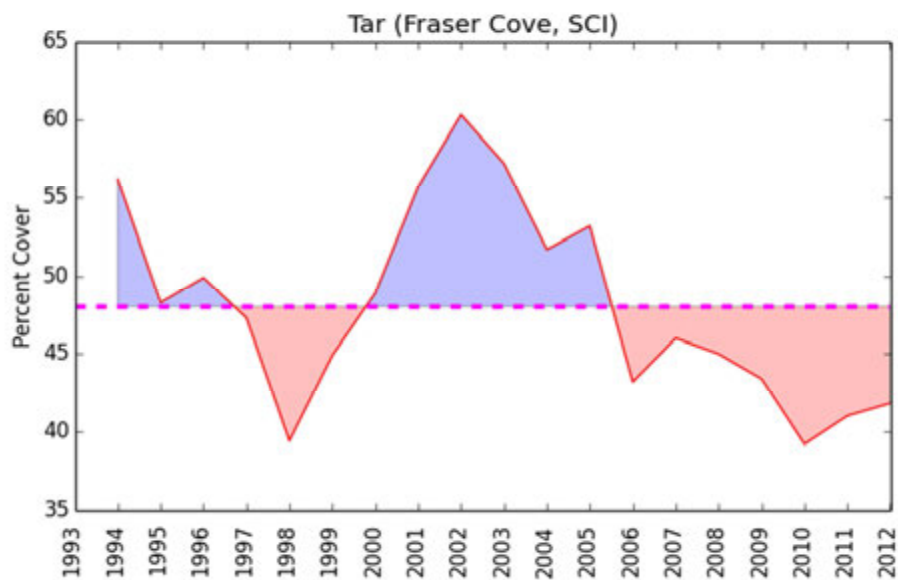


Figure 45. Departure from the long-term mean for tar at Fraser Cove, Santa Cruz Island. Shaded areas represent mean cover of tar within the representative zone pooled across plots. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

## Motile Invertebrates

Smaller motile invertebrates such as various species of limpets, chitons and snails were sampled within the fixed photoplots in past years. However, in 2012, motile invertebrates were not sampled at any site due to changes in personnel and insufficient assistance to implement the protocol. The motile invertebrate protocol is extremely time-consuming and requires a relatively high level of expertise to conduct. In addition, it has recently been determined by another intertidal monitoring group in the region that the protocol may require adjustments to improve effectiveness to detect significant changes in motile invertebrate communities (Raimondi, personal communication). Therefore the decision was made to cancel routine monitoring of smaller motile invertebrates until staffing increased and/or a complete data analysis is conducted. Motile invertebrate data from earlier years are included in CINP Rocky Intertidal Community Monitoring Program annual reports for years 2009-2011.

## *Haliotis cracherodii*

Following the collapse of the black abalone population in southern California due to Withering Syndrome (WS) in the late 1980s and 1990s, most monitoring sites at CINP have supported extremely low numbers of abalone relative to historical abundances (Figures 46-47 [density and timed search graphs]). In 2012, only three black abalone (N=1 at Harris Point and N=2 at Ford Point) were found within fixed plots (Tables 3-4).

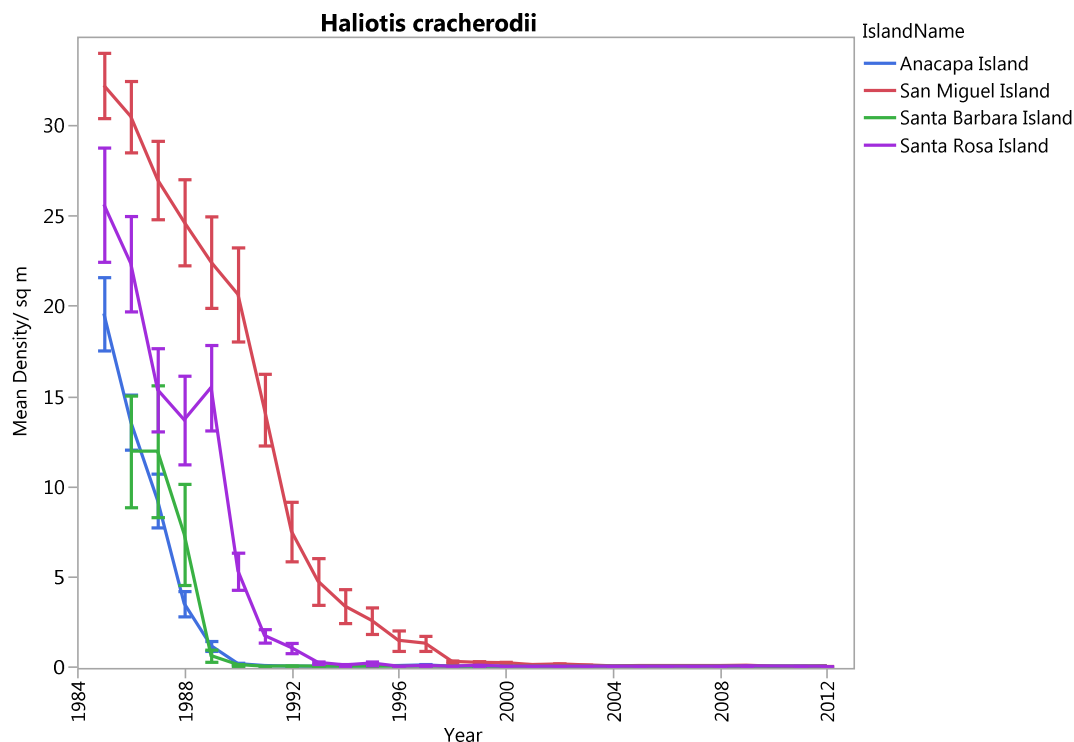


Figure 46. *Haliotis cracherodii* counts from fixed plots at all islands except Santa Cruz from 1985-2012. Note that fixed plots were not established at Santa Cruz Island. Standard error bars were constructed using 1 standard error from the mean.

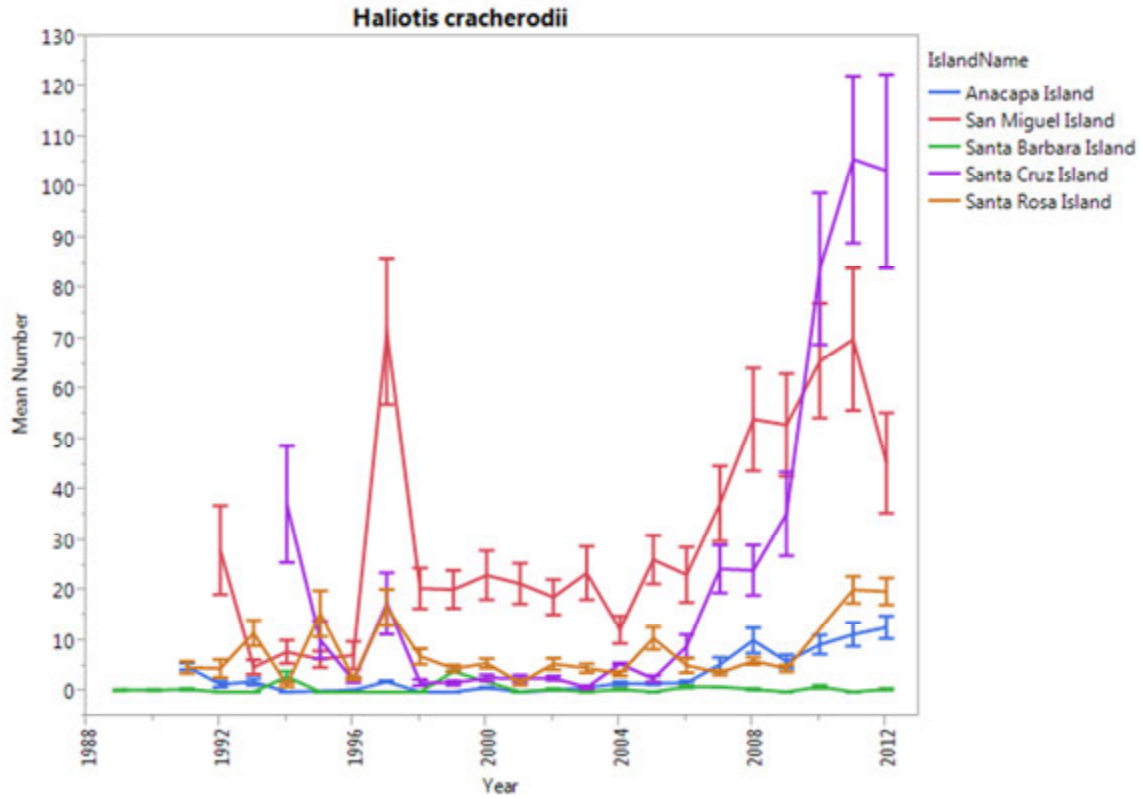


Figure 48. Black abalone, *Haliotis cracherodii*, mean counts at all islands from 1989-2013. Count data are generally derived from site-wide searches. Error bars were constructed using 1 standard error from the mean.

Table 2. *Haliotis cracherodii* searches in spring 2012.

| Site                      | Sampling Date | Abalone in plots | Abalone search                            |
|---------------------------|---------------|------------------|-------------------------------------------|
| Cuyler Harbor, SMI        | 3/14/12       | x                | 0 (30 min)                                |
| Crook Point, SMI          | nc            | nc               | nc                                        |
| Otter Harbor, SMI         | 3/19/12       | 0                | 109 (100 min, partial site)               |
| Harris Point, SMI         | 3/16/12       | 1                | 9 (30 min)                                |
| Fossil Reef, SRI          | 4/15/12       | 0                | 18 (30 min)                               |
| Johnson's Lee, SRI        | 4/16/12       | 0                | 7 (30 min)                                |
| Ford Point, SRI           | 5/23/12       | 1                | 40 (30 min)                               |
| Northwest-Talcott, SRI    | 5/24/12       | 0                | nc                                        |
| East Point, SRI           | 4/12/12       | x                | 23 (30 min)                               |
| Fraser Cove, SCI          | 5/10/12       | x                | 0 (30 min)                                |
| Trailer, SCI              | 5/9/12        | x                | 33 (30 min)                               |
| Willows Anchorage, SCI    | 5/11/12       | x                | 352 (140 min, partial site)               |
| Scorpion Rock, SCI        | nc            | x                | nc                                        |
| Prisoner's Harbor, SCI    | 5/12/12       | x                | 1 (30 min)                                |
| Orizaba Cove, SCI         | nc            | x                | nc                                        |
| Cat Rock, ANI             | nc            | nc               | nc                                        |
| South Frenchy's Cove, ANI | nc            | x                | nc                                        |
| Middle Anacapa-West       | 4/23/12       | 0                | 11 (30 min at site)<br>44 (60 min at HSA) |

x indicates no plot or transect, nc (no count performed)

Table 3. *Haliotis cracherodii* searches in fall 2012.

| Site                      | Sampling Date | Abalone in plots | Abalone search                                   |
|---------------------------|---------------|------------------|--------------------------------------------------|
| Cuyler Harbor, SMI        | 1/13/13       | x                | 0 (30 min)                                       |
| Crook Point, SMI          | 1/9/13        | 0                | 23 (30 min)                                      |
| Otter Harbor, SMI         | 1/8/13        | 0                | 159 (30 min)                                     |
| Harris Point, SMI         | 1/10/13       | 1                | 18 (30 min)                                      |
| Fossil Reef, SRI          | nc            | nc               | nc                                               |
| Johnson's Lee, SRI        | 1/22/13       | 0                | 7 (30 min)                                       |
| Ford Point, SRI           | 1/27/13       | 2                | 40 (67 min)                                      |
| Northwest-Talcott, SRI    | 1/23/13       | 0                | 0 (30 min)                                       |
| East Point, SRI           | 1/26/13       | x                | 23 (30 min)                                      |
| Fraser Cove, SCI          | 12/11/12      | x                | 1 (30 min)                                       |
| Trailer, SCI              | 12/10/12      | x                | 44 (30 min)                                      |
| Willows Anchorage, SCI    | 12/12/12      | x                | 404 (30 min, partial site)                       |
| Scorpion Rock, SCI        | 12/10/12      | x                | 31 (60 min at site A),<br>203 (65 min at site B) |
| Prisoner's Harbor, SCI    | 12/9/12       | x                | 3 (30 min)                                       |
| Orizaba Cove, SCI         | nc            | nc               | nc                                               |
| Cat Rock, ANI             | 11/27/12      | 0                | 13 (30 min)                                      |
| South Frenchy's Cove, ANI | 11/25/12      | x                | 0 (30 min)                                       |
| Middle Anacapa-West       | 11/27/12      | x                | 27 (30 min)                                      |
| Sea Lion Rookery, SBI     | 11/13/12      | 0                | 0 (30 min)                                       |
| Landing Cove, SBI         | 11/12/12      | x                | 1 (30 min)                                       |

x indicates no plot or transect, nc (no count performed)

During routine timed searches, black abalone were entirely absent from Cuyler Harbor, Northwest-Talcott, Sea Lion Rookery and South Frenchy's Cove. Of the remaining sites where black abalone were seen, fewer than 10 individuals were located at Fraser Cove, Harris Point, Johnson's Lee, Landing Cove and Prisoners Harbor. In contrast, > 100 black abalone were observed at three sites (Otter Harbor, Scorpion Rock [Site B] and Willows Anchorage). Note that search effort increased at Ford Point, Harbor Seal Arch (site is monitored as part of Anacapa Middle West), Otter Harbor, Scorpion Rock (Site B) and Willows Anchorage due to the greater number of abalone that occurred at those locations and the greater availability of time.

With the exception of several of the San Miguel and Santa Rosa sites, counts at all islands were consistent with the range of counts seen in the last several years (Figure 53 [timed search for all years] and 49-53). At San Miguel, mean counts for black abalone in 2012 appeared to decrease compared to counts in 2011 and 2010; yet they remained above the grand mean for earlier years (1992-2011) (Figure 52). It is important to note that black abalone counts at all locations, excluding Santa Barbara Island sites, have increased above the long-term mean in recent years beginning approximately 2007-2009, or 2011 in the case of Santa Rosa Island sites (Figures 49, 51-53). At Santa Rosa Island, unfortunately it is difficult to make comparisons with recent years since black abalone were not sampled in 2010 due to logistical issues. The mean number of black abalone was markedly higher at Santa Rosa in 2012 compared with that of 2009 and earlier years (Figure 53).

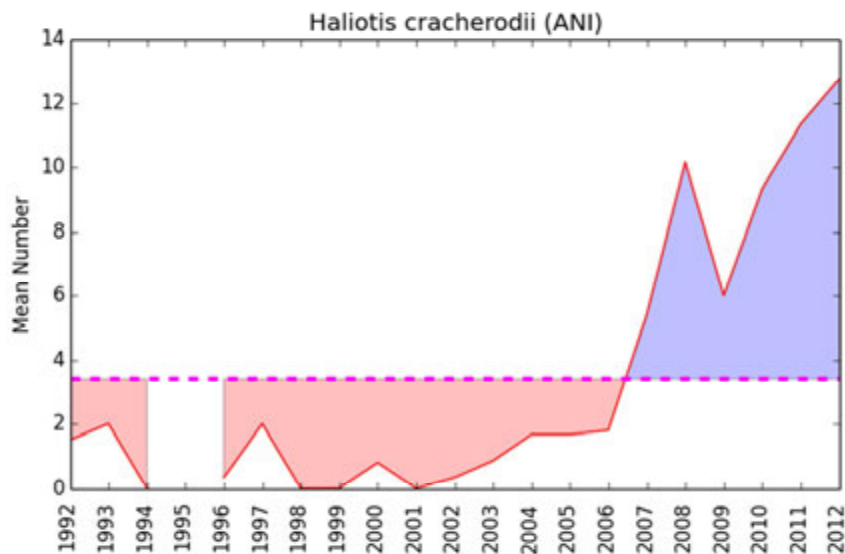


Figure 49. Departure from the long-term mean for *Haliotis cracherodii* at Anacapa Island. Shaded areas represent mean number of *H. cracherodii* at each island generated from site-wide counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

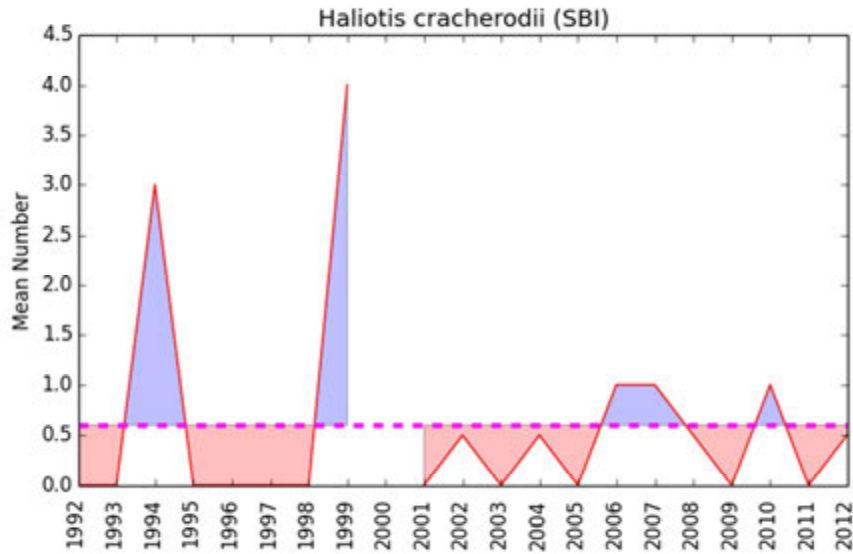


Figure 50. Departure from the long-term mean for *Haliotis cracherodii* at Santa Barbara Island. Shaded areas represent mean number of *H. cracherodii* at each island generated from site-wide counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

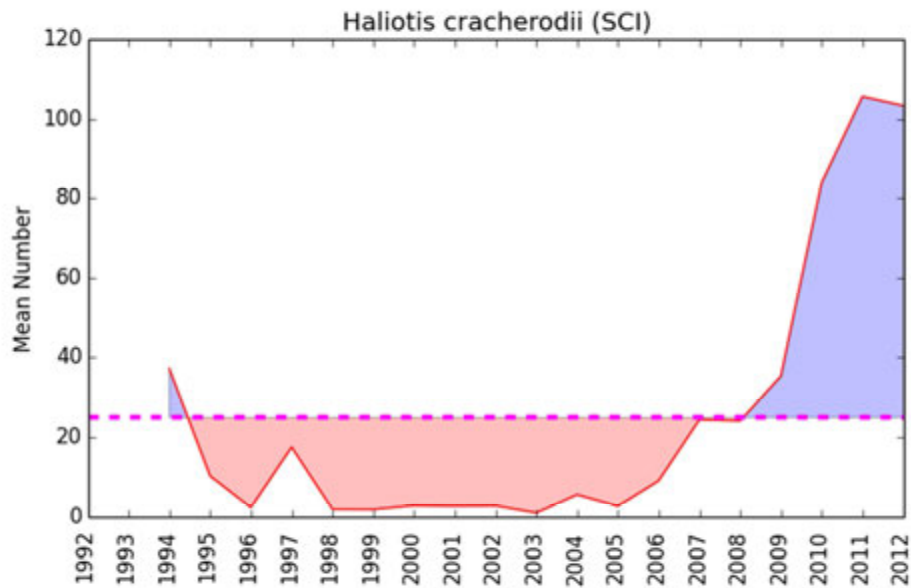


Figure 51. Departure from the long-term mean for *Haliotis cracherodii* at Santa Cruz Island. Shaded areas represent mean number of *H. cracherodii* at each island generated from site-wide counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

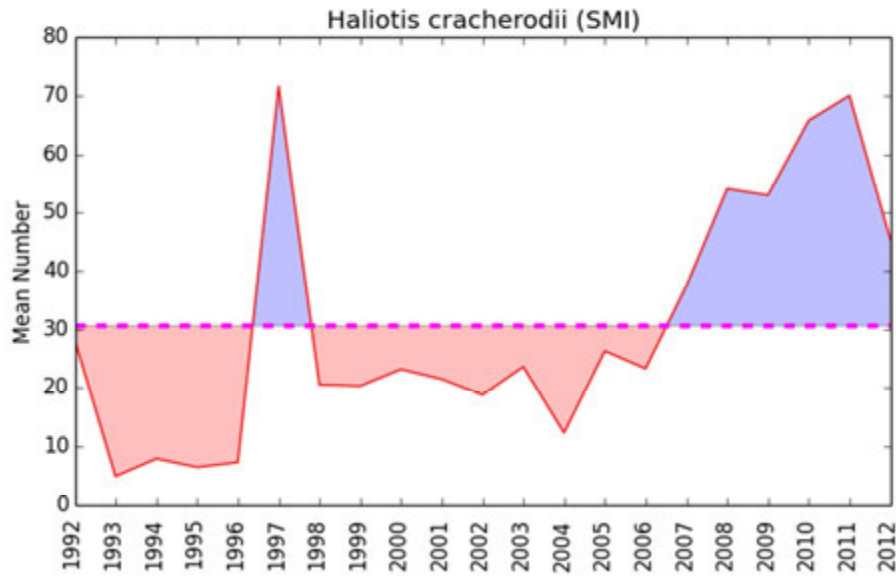


Figure 52. Departure from the long-term mean for *Haliotis cracherodii* at San Miguel Island. Shaded areas represent mean number of *H. cracherodii* at each island generated from site-wide counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

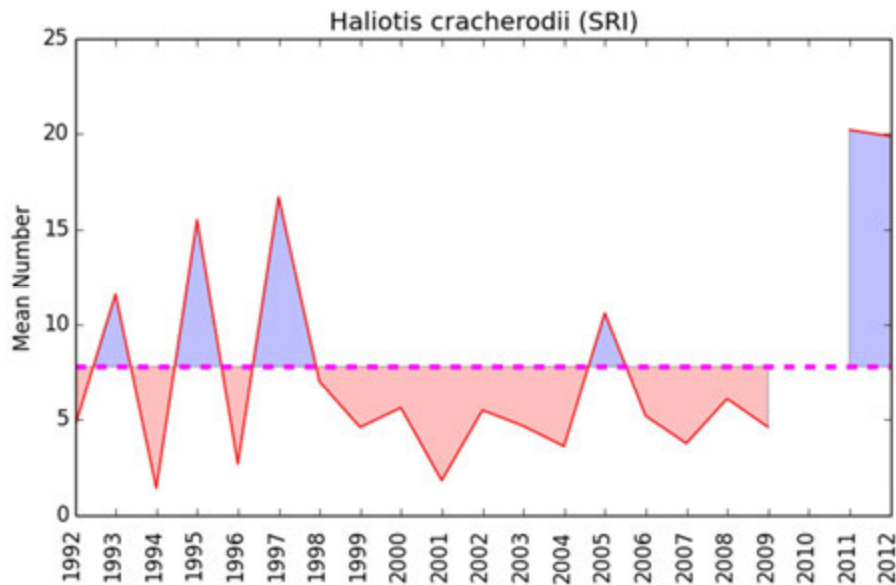


Figure 53. Departure from the long-term mean for *Haliotis cracherodii* at Santa Rosa Island. Shaded areas represent mean number of *H. cracherodii* at each island generated from site-wide counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Beginning in 2005, substantial increases (from zero to hundreds) in the numbers of juvenile black abalone have been documented at Willows Anchorage and Valley Anchorage, Santa Cruz Island (Figures 54-55), as well as various locations along the south and north sides of Santa Cruz Island that

were sampled once in 2010 (see Whitaker and Richards 2012). To a lesser extent, similar increases in abundances of black abalone have been observed at Orizaba Cove on Santa Cruz Island and Middle Anacapa Island during the same survey period. In 2012, the size frequencies for Anacapa and Santa Cruz Island sites reflected the effects of recruitment and the presence of juvenile black abalone with modes ranging 60-90 mm (Figure 56). At Santa Cruz Island, the size distributions for black abalone were moderately positive-skewed in spring, further indicating the presence of juvenile individuals. Recruitment pulses in recent years are evidenced at both Anacapa and Santa Cruz Islands by decreases in mean shell length.

Black abalone populations at San Miguel and Santa Rosa Islands continue to show small signs of expansion but juveniles are rarely seen. As a result, populations at those islands remain less than one percent of historic levels. The size frequency data for black abalone at San Miguel Island were fairly symmetric in both spring and fall samples with modes centered on 100 mm and 110 mm, respectively. At Santa Rosa, the size-distributions of abalone during spring and fall were also approximately symmetrical-shaped even though the spring sample was relatively bimodal.

The Santa Barbara Island size-distribution was not estimated in 2012 because only one black abalone was seen between the two sites (Landing Cove) on the island.

Last year (2011), one large abalone that appeared to be shrunken, a symptom of WS, was found at Otter Harbor during the spring sample. The animal was however, firmly attached to the substratum and responded with movement and increased grip when it was measured. No other abalone with signs of WS was observed at any of the monitoring sites at 2011. In 2012, no signs of WS were observed.

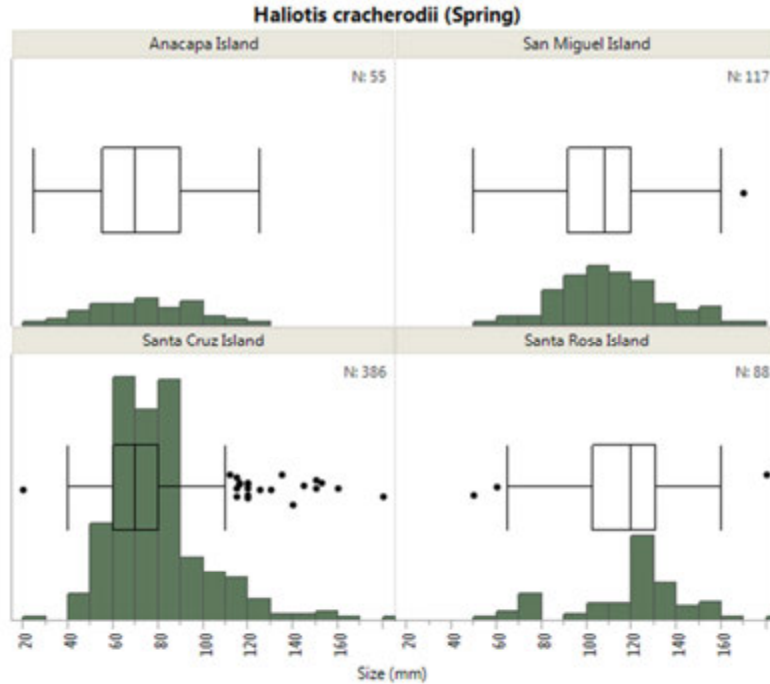


Figure 54. *Haliotis cracherodii* size distributions pooled across sites at each island measured in spring 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

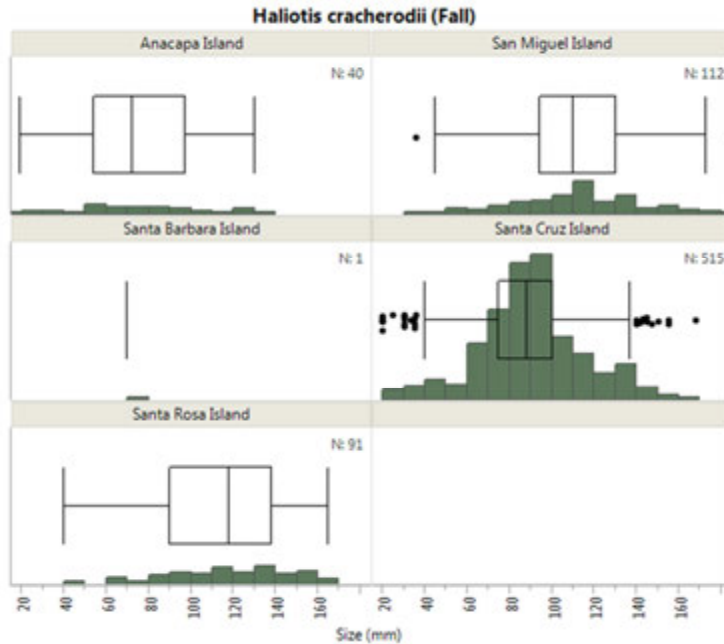


Figure 55. *Haliotis cracherodii* size distributions pooled across sites at each island measured in fall 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

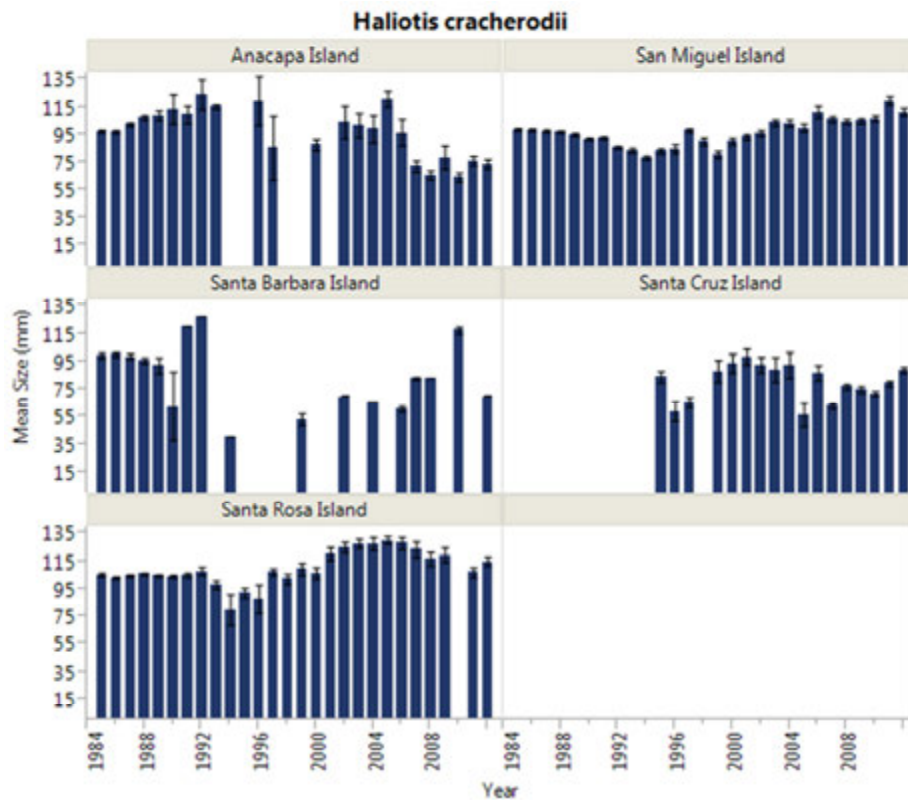


Figure 56. *Haliotis cracherodii* mean sizes pooled across sites at each island.

## Lottia gigantea

Owl limpets, *Lottia gigantea*, are typically sampled in fall. However *L. gigantea* were sampled at Anacapa Middle West in both spring and fall. Fossil Reef was the only site with fixed owl limpet plots that was not sampled in 2012.

The mean number of limpets ranged 5-31.2 per plot across all sites that were sampled in 2012 (Figure 57). Willows Anchorage had the greatest number of *L. gigantea* and South Frenchy's Cove had the least. Five sites had mean abundances for owl limpets that were less than 10 individuals per plot. Mean abundances of limpets ranged 10-20 per plot at four sites and greater than 20 at three sites. All sites exhibited only small changes in mean abundances of *L. gigantea* in 2012 compared to data collected during the most recent five years. The only exception was Anacapa Middle West, which appeared to have experienced a marked decrease in abundance of owl limpets since 2007.

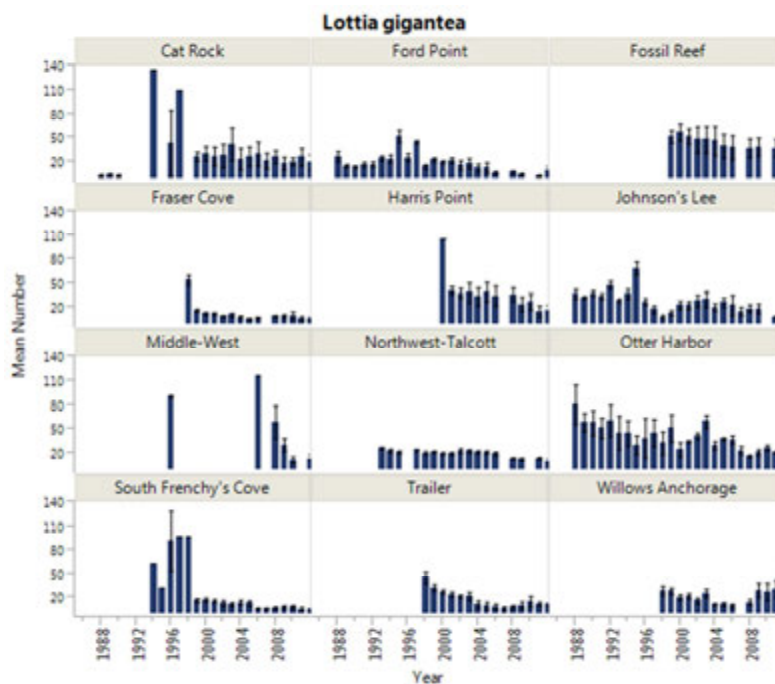


Figure 57. *Lottia gigantea* mean number pooled across plots at each site with fixed plots.

Departure from the mean graphs indicate that negative changes in mean abundances of *L. gigantea* occurred at Anacapa and particularly San Miguel Island in 2012 compared to previous years (Figures 58-61). At Santa Cruz, the mean number of owl limpets increased slightly. Note that 2012 data are not presented for Santa Barbara or Santa Rosa Islands since fixed plots for *L. gigantea* have not been established, or one or more sites at the island were not sampled during the year, respectively.

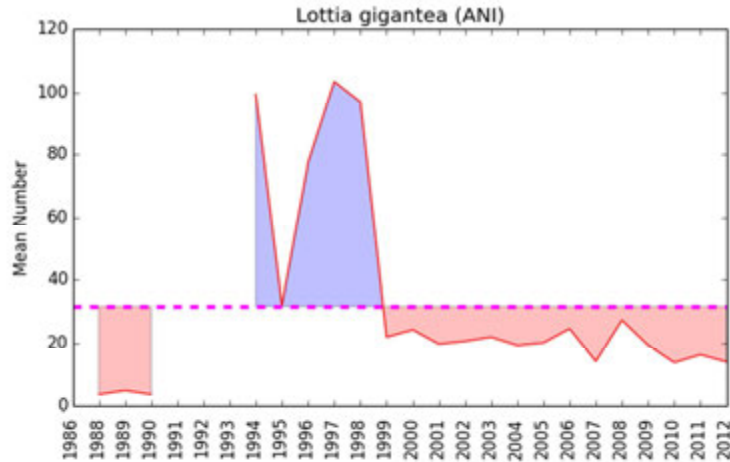


Figure 58. Departure from the long-term mean for *Lottia gigantea* at Anacapa Island. Shaded areas represent mean number of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

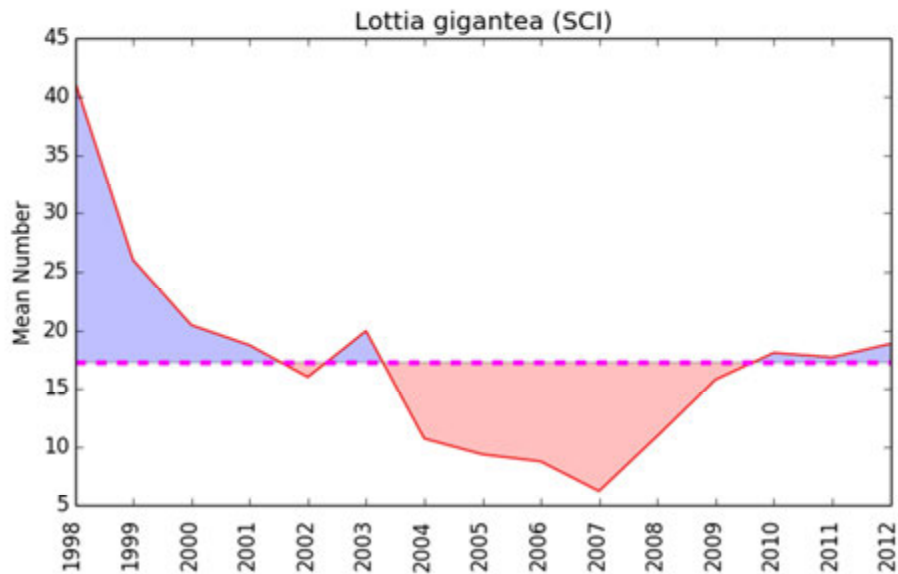


Figure 59. Departure from the long-term mean for *Lottia gigantea* at Santa Cruz Island. Shaded areas represent mean number of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

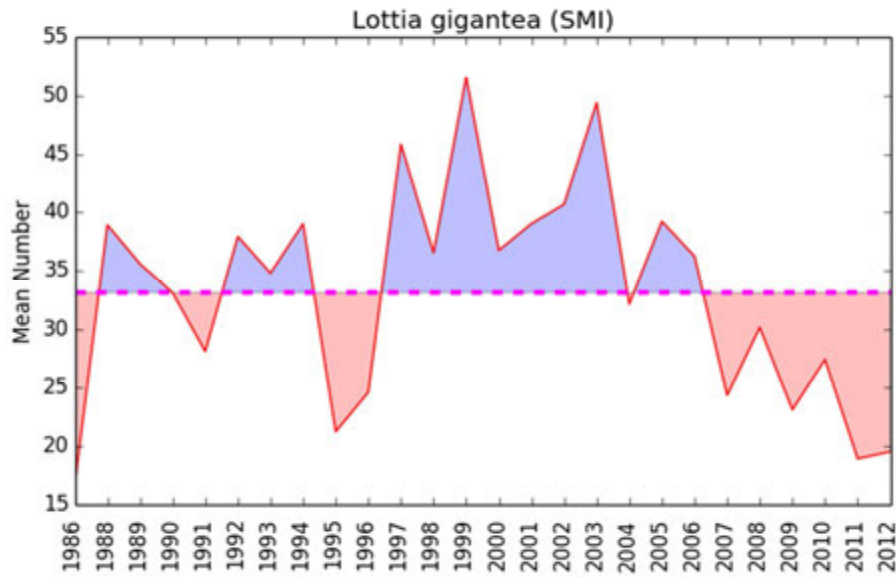


Figure 60. Departure from the long-term mean for *Lottia gigantea* at San Miguel Island. Shaded areas represent mean number of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean

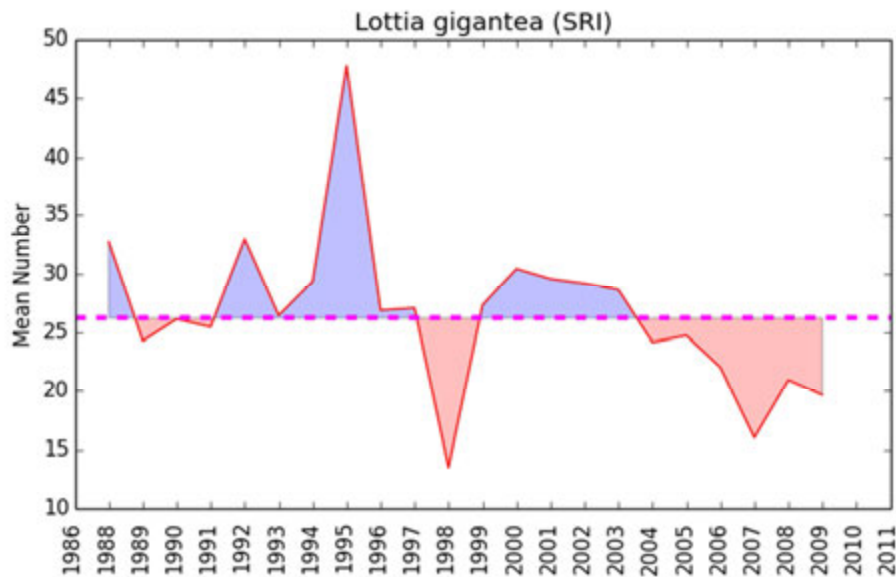


Figure 61. Departure from the long-term mean for *Lottia gigantea* at Santa Rosa Island. Shaded areas represent mean number of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean

*L. gigantea* size distributions pooled by sites and islands are displayed in Figures 62-67.

Distributions at Anacapa and San Miguel Islands appeared symmetric with similar mean and median values for both island populations (Figures 62 and 65, Table 4). Size distributions for Santa Cruz, and

to a lesser degree, Santa Rosa Island were positive-skewed in 2012 whereby mean values for both populations were slightly higher than the median sizes.

The mean sizes of *L. gigantea* in 2012 varied among sites and islands, but only minimal temporal changes were documented within most sites (Figures 62-66, Table 4). Median sizes ranged approx. 26-78 mm across all sites sampled in 2012 with the smallest owl limpets measured at Ford Point and the largest at Trailer. When pooled across islands, the smallest (median ~ 37 mm) limpets occurred at Anacapa and San Miguel followed by Santa Cruz (median ~ 45 mm) and Santa Rosa (~ 50 mm).

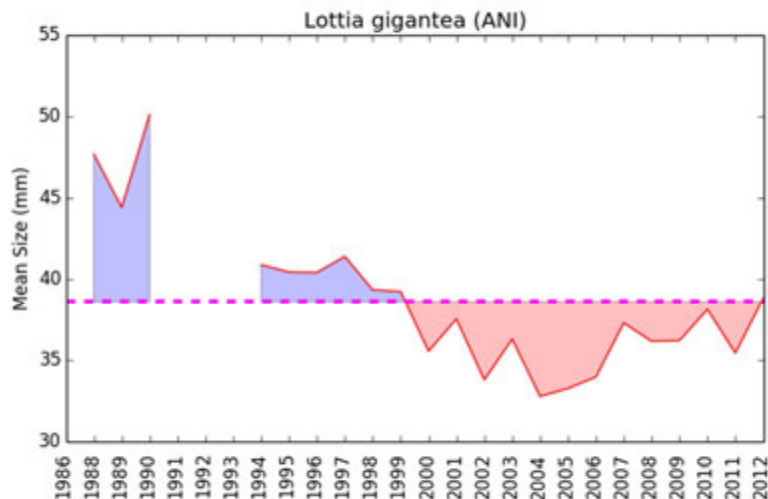


Figure 62. Departure from the long-term mean for *Lottia gigantea* at Anacapa Island. Shaded areas represent mean size of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

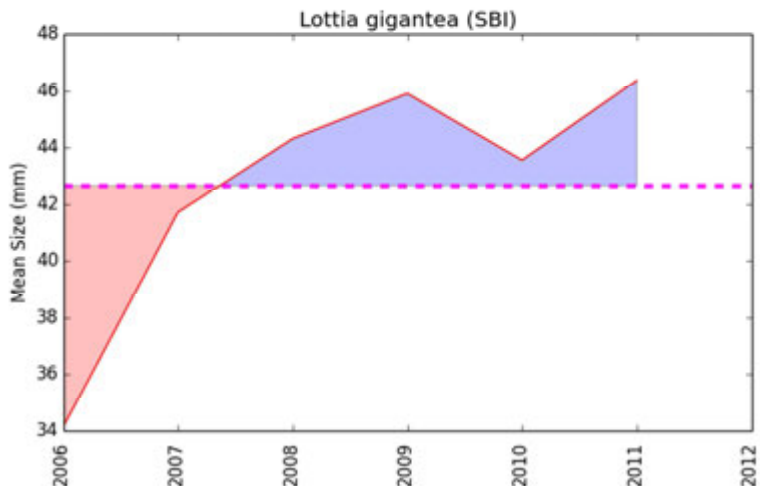


Figure 63. Departure from the long-term mean for *Lottia gigantea* at Santa Barbara Island. Shaded areas represent mean size of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

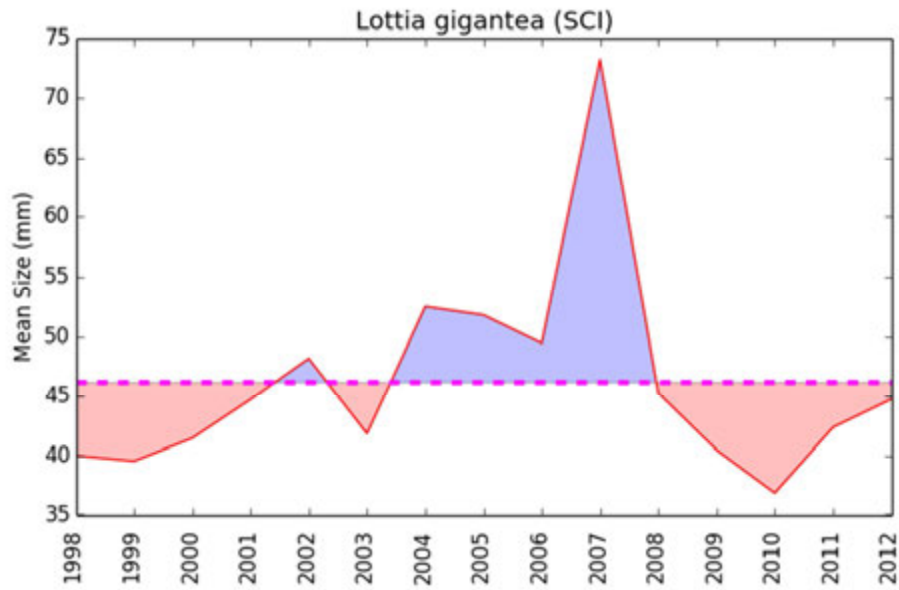


Figure 64. Departure from the long-term mean for *Lottia gigantea* at Santa Cruz Island. Shaded areas represent mean size of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

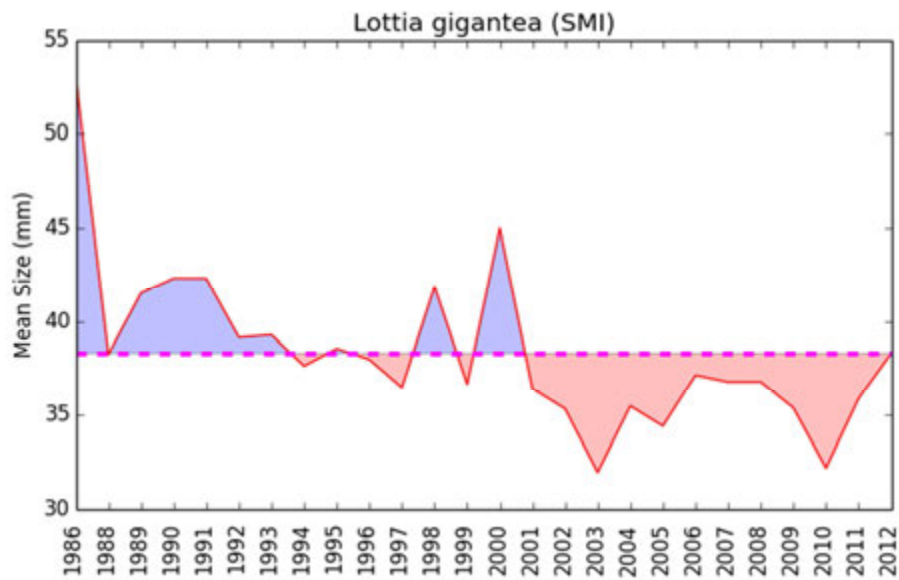


Figure 65. Departure from the long-term mean for *Lottia gigantea* at San Miguel Island. Shaded areas represent mean size of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

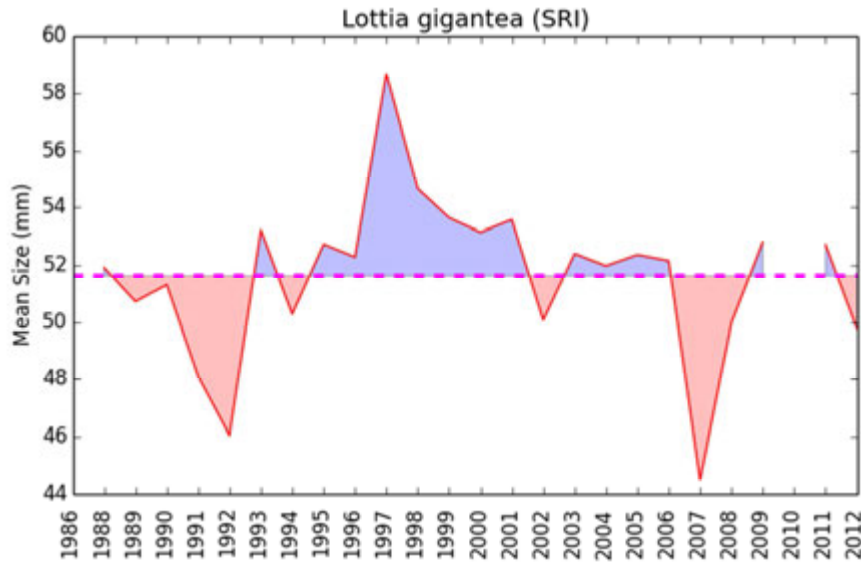


Figure 66. Departure from the long-term mean for *Lottia gigantea* at Santa Rosa Island. Shaded areas represent mean size of *L. gigantea* at each island generated from fixed-plot counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Table 4. *Lottia gigantea* plot count and size information for 2012. All sites pooled by island.

| Island Code           | Season | Count Random | Count Density | Area | Density | Median Size | Mean Size | StDev | Min Size | Max Size |
|-----------------------|--------|--------------|---------------|------|---------|-------------|-----------|-------|----------|----------|
| AN (only ANMW)        | spring | 0            | 34            | 9.4  | 3.62    | 46.5        | 46.59     | 12.09 | 21       | 66       |
| AN                    | fall   | 0            | 148           | 28.3 | 5.23    | 36.0        | 35.45     | 10.95 | 15       | 60       |
| SB                    | fall   | nc           | 0             | N/A  | N/A     | nm          | nm        | nm    | nm       | nm       |
| SC                    | fall   | 0            | 226           | 47.1 | 5.63    | 48.0        | 51.73     | 21.13 | 18       | 100      |
| SM                    | fall   | 0            | 195           | 31.4 | 6.21    | 41.0        | 41.97     | 13.57 | 15       | 68       |
| SR (SRFR not sampled) | fall   | 0            | 146           | 47.1 | 3.10    | 56.5        | 54.75     | 26.71 | 14       | 103      |

All sites poled by island (Santa Rosa spring sample excluded Fossil Reef). AN=Anacapa, SB= Santa Barbara, SC=Santa Cruz, SM=San Miguel, SR=Santa Rosa, nc=no count performed, nm=no measurements taken.

Compared with previous years, the mean sizes of *L. gigantea* at most islands in 2012 remained roughly equivalent to long-term means generated for each island (Figures 67-69). The only exception may be Santa Rosa Island, which experienced a slight drop in mean size of limpets. Mean sizes in 2012 ranged 37-49 mm at the island level with the smallest *L. gigantea* at San Miguel Island and the largest at Santa Rosa.

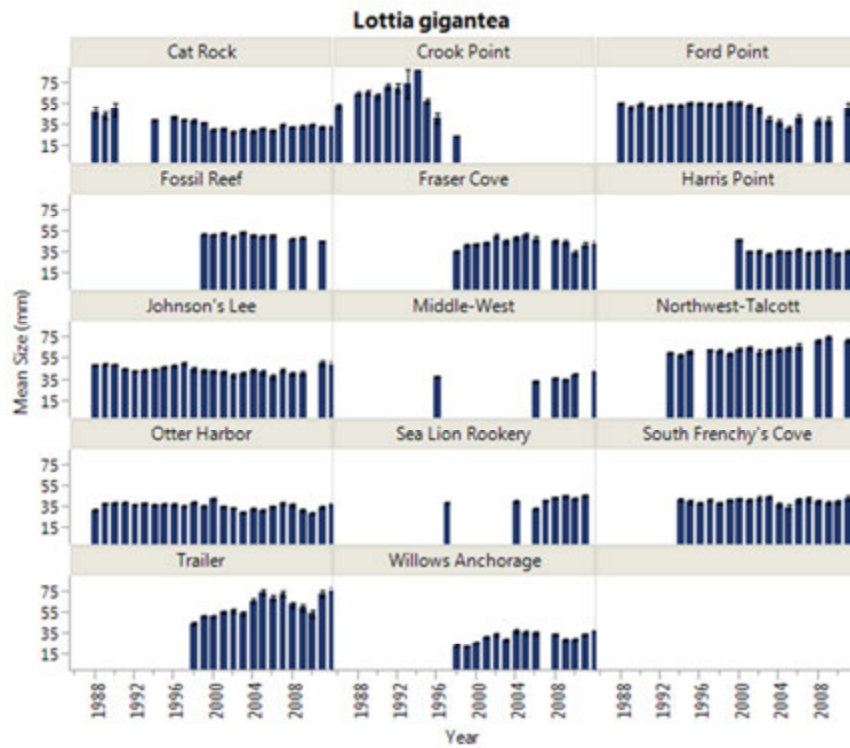


Figure 67. *Lottia gigantea* mean sizes pooled across plots at all sites with fixed plots.

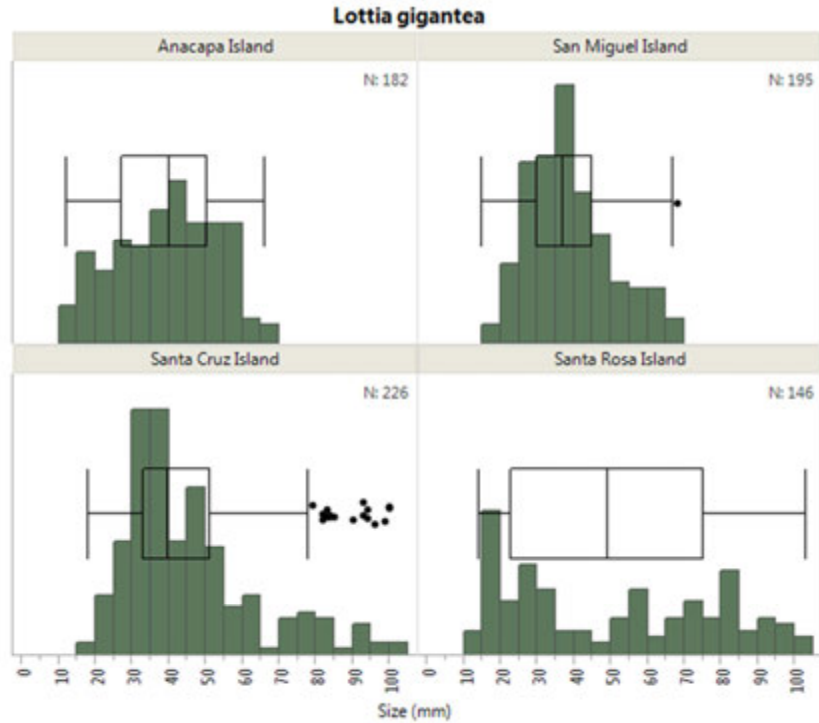


Figure 68. *Lottia gigantea* size distributions at each site measured in spring 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

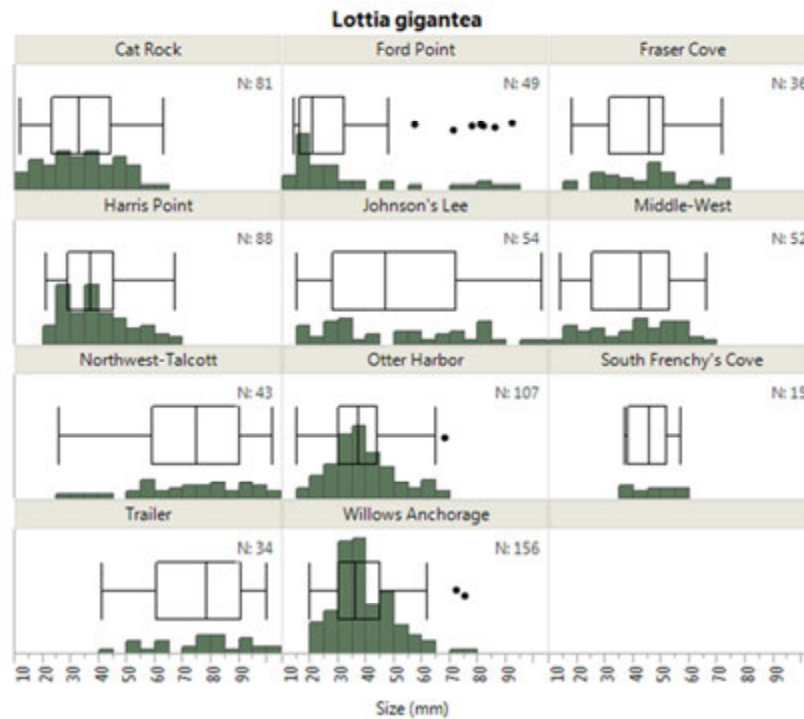


Figure 69. *Lottia gigantea* size distributions at each site measured in fall 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

### **Pisaster ochraceus**

Temporally, the abundances of *P. ochraceus*, sea stars have fluctuated markedly at most sites, with the exceptions of Cat Rock, Harris Point, Northwest-Talcott, and South Frenchy's Cove which have historically supported low (i.e. < 35 *P. ochraceus*) numbers of sea stars. Sites are generally sampled for sea star abundance in both spring and fall. Some sites, however, were only sampled in fall (see Tables 5 and 6 for details).

Table 5. *Pisaster ochraceus* searches in spring 2012.

| Island Code | Site Name            | Survey Date | N   | Search Time |
|-------------|----------------------|-------------|-----|-------------|
| ANI         | Cat Rock             | NS          |     |             |
| ANI         | Middle-West          | 4/24/2012   | 100 | 30          |
|             | South Frenchy's Cove | NS          |     |             |
| ANI         | Landing Cove         | NS          |     |             |
| SBI         | Sea Lion Rookery     | NS          |     |             |
| SCI         | Fraser Cove          | 4/25/2012   | 240 | 30          |
| SCI         | Prisoner's Harbor    | 4/26/2012   | 57  | 30          |
| SCI         | Scorpion Rock        | NS          |     |             |
| SCI         | Trailer              | 4/27/2012   | 302 | 30          |
| SCI         | Valley Anchorage     | NS          |     |             |
| SCI         | Willows Anchorage    | 4/28/2012   | 719 | 30          |
| SMI         | Crook Point          | NS          |     |             |
| SMI         | Cuyler Harbor        | 4/29/2012   | 35  | 30          |
| SMI         | Harris Point         | 4/30/2012   | 31  | 30          |
| SMI         | Otter Harbor         | 5/1/2012    | 113 | 30          |
| SRI         | East Point           | 5/2/2012    | 295 | 30          |
| SRI         | Ford Point           | 5/3/2012    | 246 | 30          |
| SRI         | Fossil Reef          | 5/4/2012    | 228 | 30          |
| SRI         | Johnson's Lee        | 5/5/2012    | 350 | 30          |
| SRI         | Northwest-Talcott    | NS          |     |             |

NS= Not Sampled

Table 6. *Pisaster ochraceus* searches in fall 2012.

| Island Code | Site Name            | Survey Date | N   | Search Time |
|-------------|----------------------|-------------|-----|-------------|
| ANI         | Cat Rock             | 11/26/2012  | 22  | 30          |
| ANI         | Middle-West          | 11/27/2012  | 343 | 30          |
| ANI         | South Frenchy's Cove | 11/28/2012  | 17  | 30          |
| SBI         | Landing Cove         | 11/29/2012  | 97  | 30          |
| SBI         | Sea Lion Rookery     | 11/30/2012  | 145 | 30          |
| SCI         | Fraser Cove          | 12/1/2012   | 139 | 30          |
| SCI         | Prisoner's Harbor    | 12/2/2012   | 38  | 30          |
| SCI         | Scorpion Rock        | 12/3/2012   | 143 | 30          |
| SCI         | Trailer              | 12/4/2012   | 224 | 30          |
| SCI         | Valley Anchorage     | 12/5/2012   | 106 | 30          |
| SCI         | Willows Anchorage    | 12/6/2012   | 266 | 30          |
| SMI         | Crook Point          | 12/8/2012   | 97  | 30          |
| SMI         | Cuyler Harbor        | 12/7/2012   | 50  | 30          |
| SMI         | Harris Point         | 12/9/2012   | 16  | 30          |
| SMI         | Otter Harbor         | 12/10/2012  | 72  | 30          |
| SRI         | East Point           | 12/11/2012  | 296 | 30          |
| SRI         | Ford Point           | 12/12/2012  | 253 | 30          |
| SRI         | Fossil Reef          | NS          |     |             |
| SRI         | Johnson's Lee        | 12/13/2012  | 379 | 30          |
| SRI         | Northwest-Talcott    | 12/14/2012  | 3   | 30          |

Compared with previous years, sea stars were moderately abundant at most sites in 2012. Extremely high abundances (~ 500 *P. ochraceus*) were only documented at one site (Willows Anchorage in spring) in contrast to past years in which as many as five sites had unusually high numbers of sea stars counted during 30-minute searches. Still, 10 of 20 sites had between 100 and 379 sea stars during one or both seasons in 2012. Only three *P. ochraceus* were seen at Northwest-Talcott, but it is not unusual to find very few, if any, ochre stars at that site (Figure 70-71).

Departure from the mean graphs indicate that negative changes in mean abundances of *L. gigantea* occurred at Santa Barbara and to a lesser degree, San Miguel Island in 2012 compared to previous years (Figures 72-76). Slightly positive changes in mean abundances occurred at Anacapa, Santa Cruz and Santa Rosa Islands in 2012.

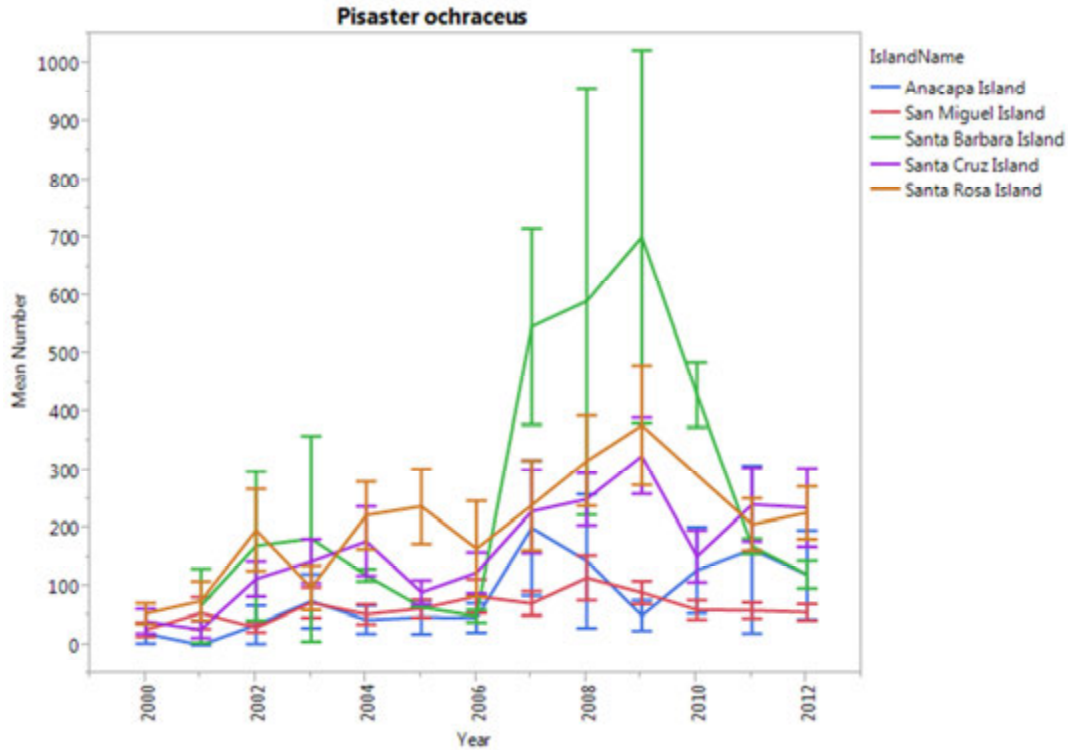


Figure 70. *Pisaster ochraceus* counts pooled across each island from 1999-2012. Count data were attained from timed-(30 minute) searches.

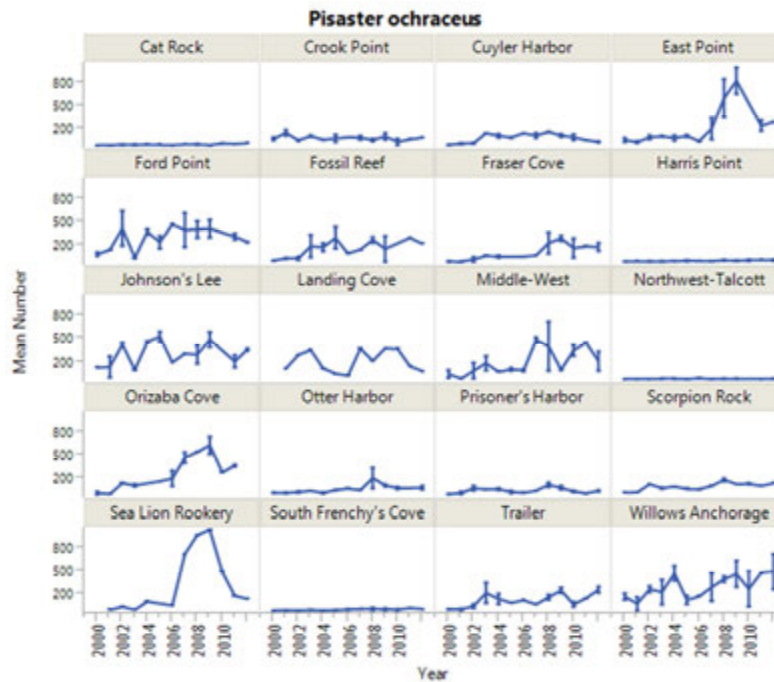


Figure 71. *Pisaster ochraceus* counts at each site from 1999-2012. Count data were attained from timed-(30 minute) searches.

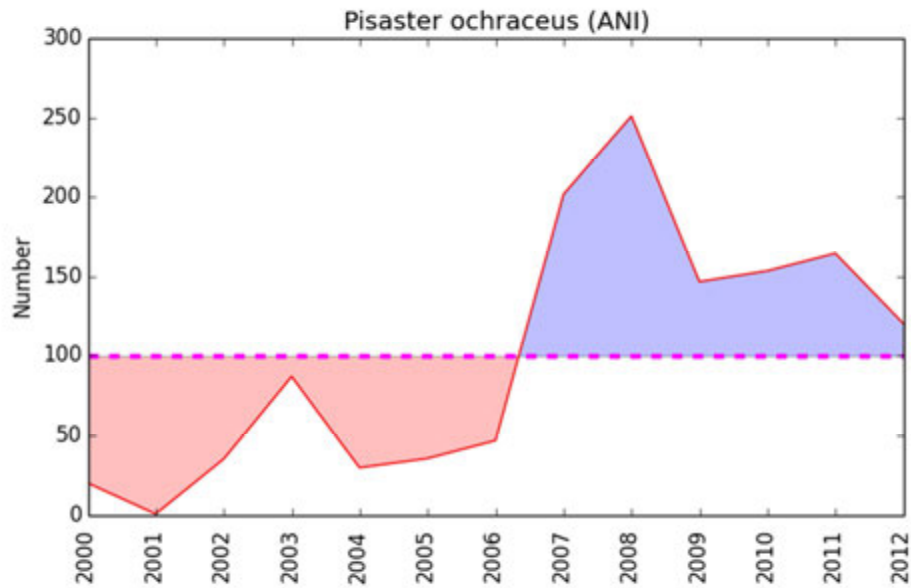


Figure 72. Departure from the long-term mean for *Pisaster ochraceus* at Anacapa Island. Shaded areas represent the number of *P. ochraceus* at each island generated timed-counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

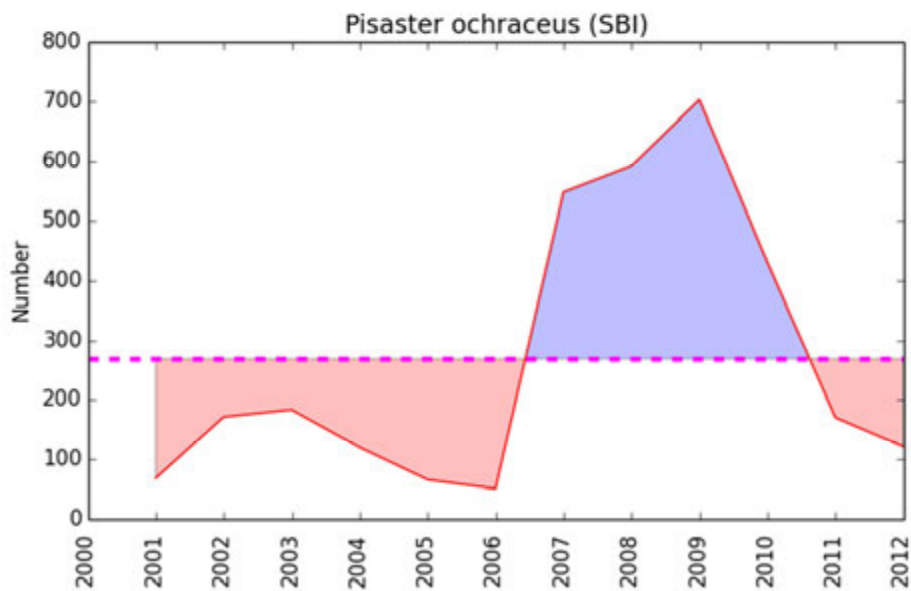


Figure 73. Departure from the long-term mean for *Pisaster ochraceus* at Santa Barbara Island. Shaded areas represent the number of *P. ochraceus* at each island generated timed-counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

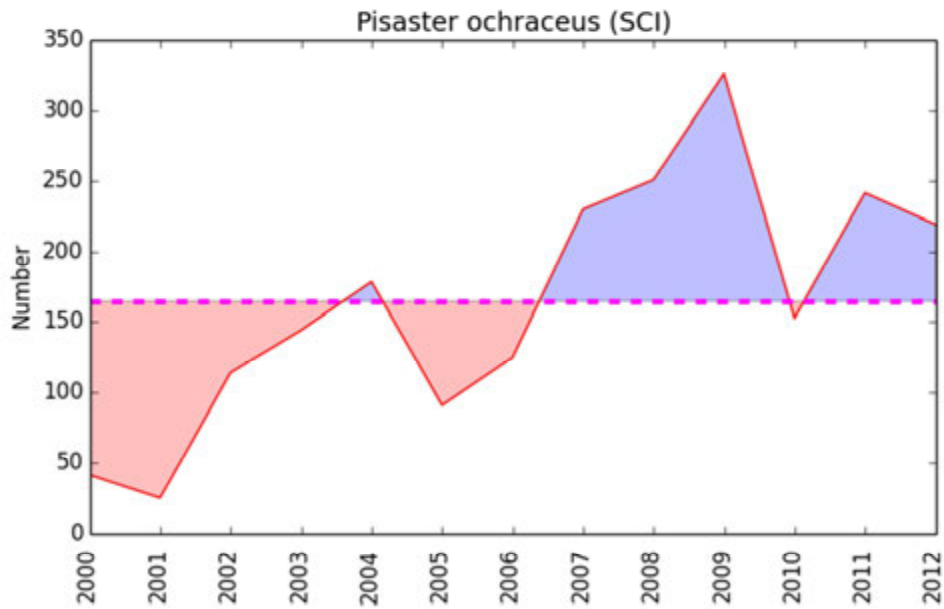


Figure 74. Departure from the long-term mean for *Pisaster ochraceus* at Santa Cruz Island. Shaded areas represent the number of *P. ochraceus* at each island generated timed-counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

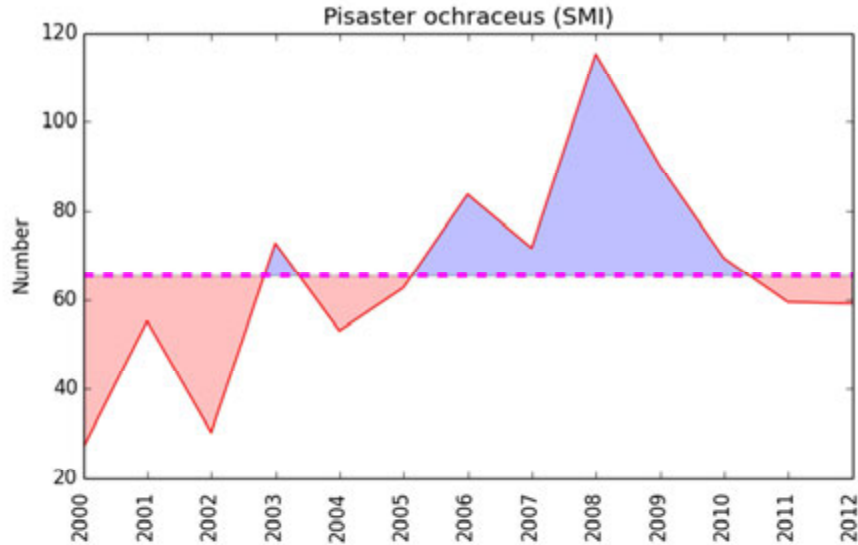


Figure 75. Departure from the long-term mean for *Pisaster ochraceus* at San Miguel Island. Shaded areas represent the number of *P. ochraceus* at each island generated timed-counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

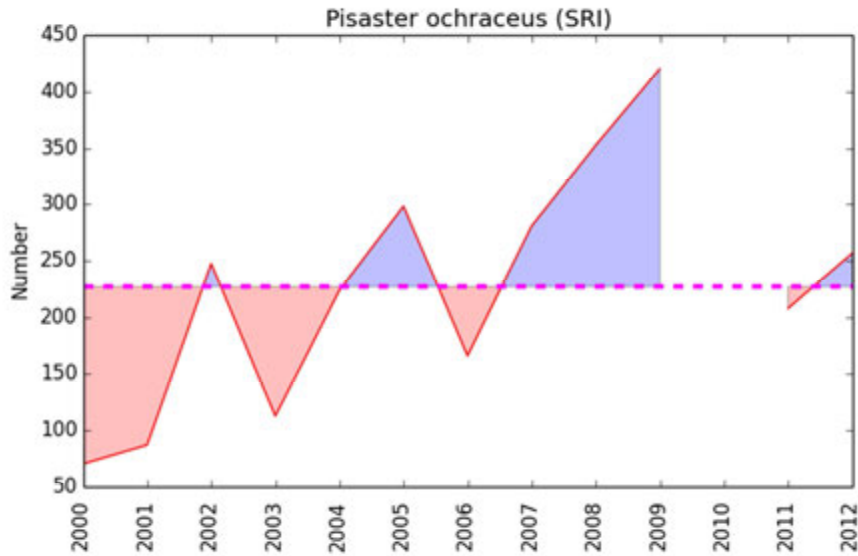


Figure 76. Departure from the long-term mean for *Pisaster ochraceus* at Santa Rosa Island. Shaded areas represent the number of *P. ochraceus* at each island generated timed-counts pooled across sites. Blue shaded areas indicate values greater and red areas equal less than the long-term mean. Pink dashed line represents long-term mean.

Size frequency measurements were collected at all sites sampled for *P. ochraceus* in 2012 (Figures 77-82). *P. ochraceus* populations at most sites were normally-distributed with modes typically between 70 mm and 150 mm. Exceptions were at East Point, Fossil Reef and Johnson's Lee in spring, and Ford Point in fall whereby populations were moderately positive-skewed. Additionally, the sea star population at Sea Lion Rookery was moderately negative-skewed in fall. Proportionally, Ford Point and Valley Anchorage had the smallest sea stars and Fraser Cove, Harris Point, Otter Harbor and Sea Lion Rookery had the largest.

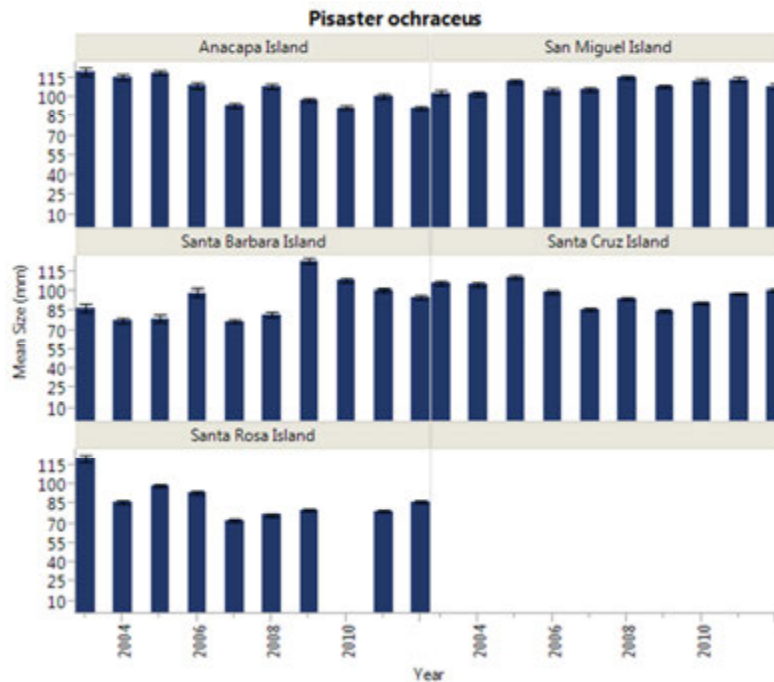


Figure 77. *Pisaster ochraceus* mean sizes pooled across sites at each island.

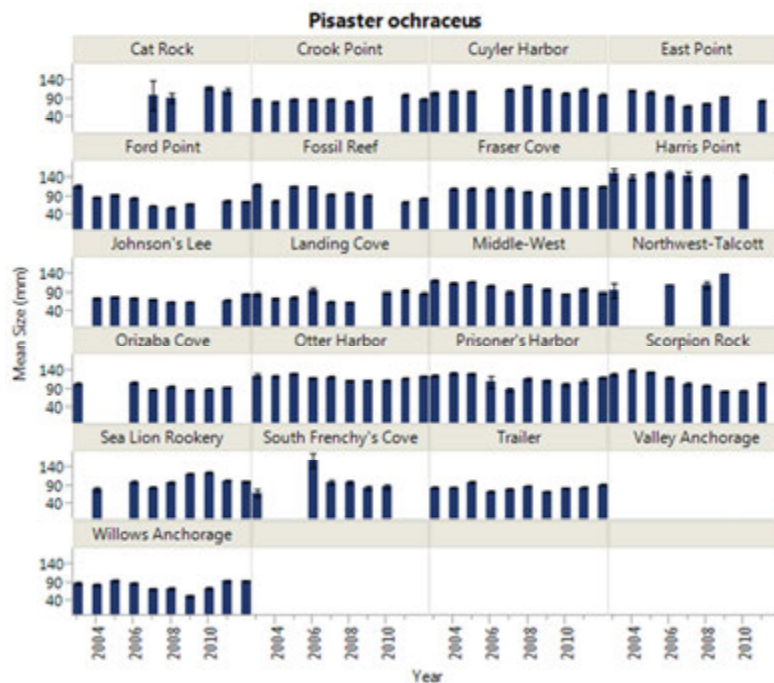


Figure 78. *Pisaster ochraceus* mean sizes pooled across plots at each site.

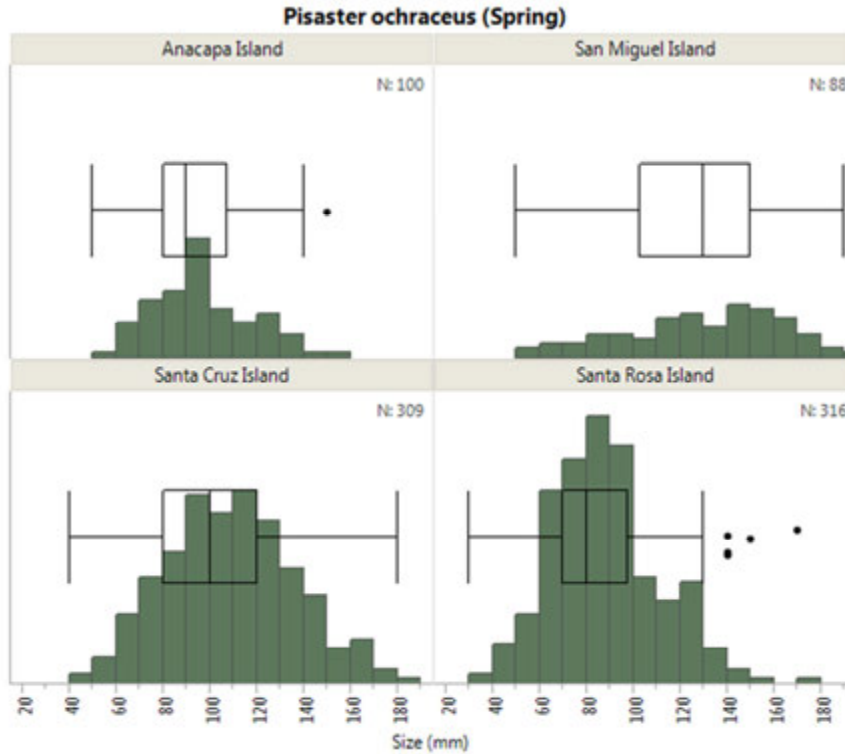


Figure 79. *Pisaster ochraceus* size distributions at each island measured in spring 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

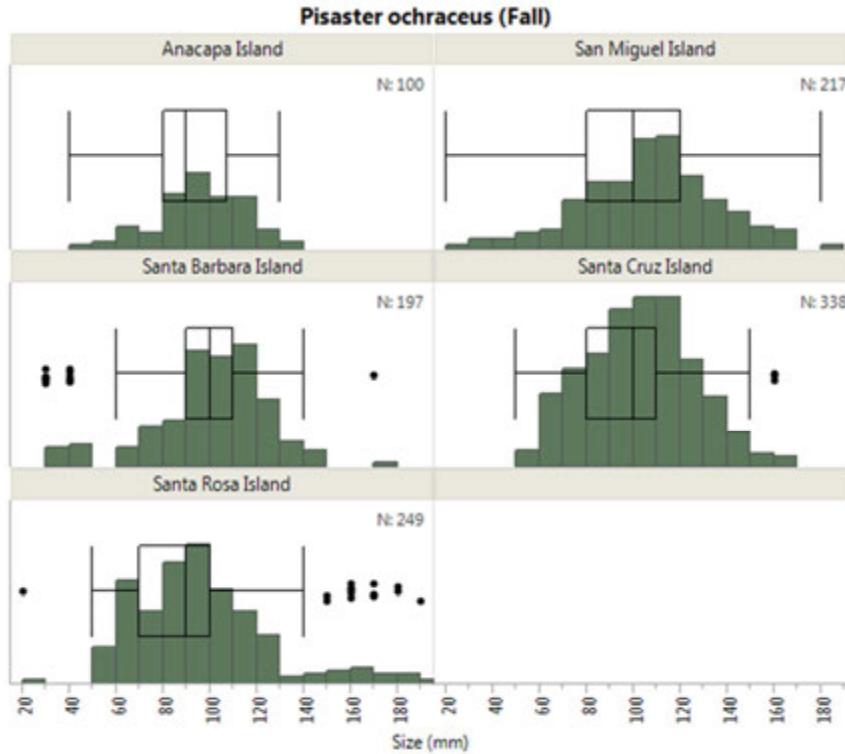


Figure 80. *Pisaster ochraceus* size distributions at each island measured in fall 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

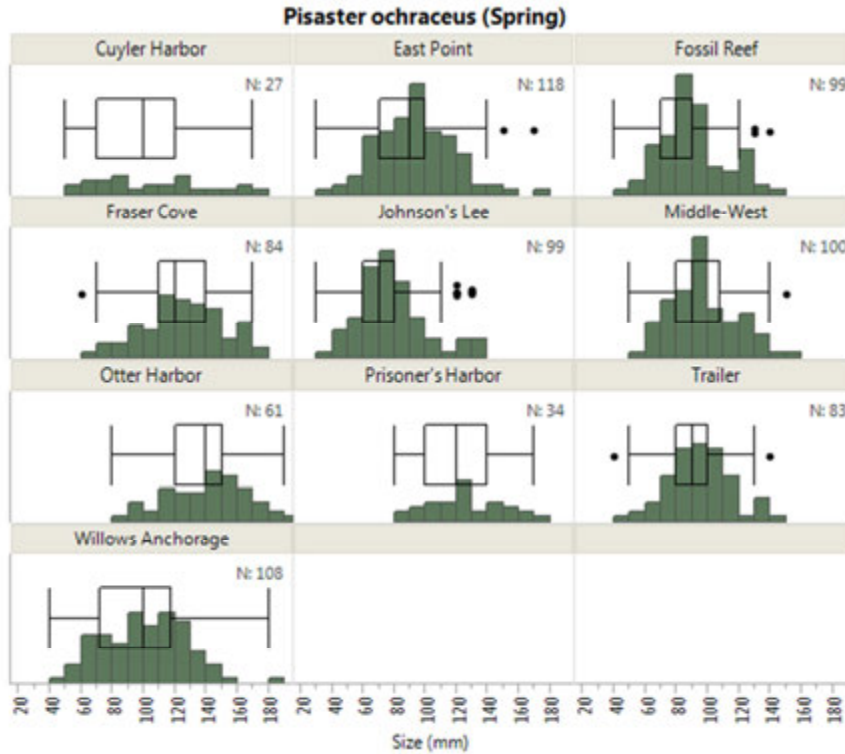


Figure 81. *Pisaster ochraceus* size distributions at each site measured in spring 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

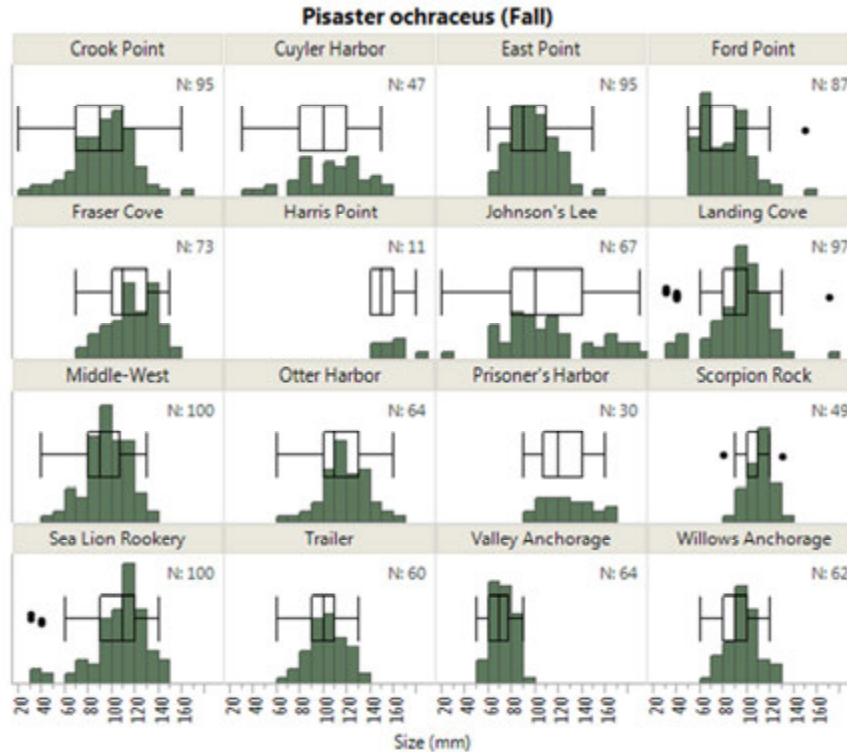


Figure 82. *Pisaster ochraceus* size distributions at each site measured in fall 2012. Box-and-whisker plots indicate the spread and degree of skewness of the size frequency data. The ends of the boxes represent the 25<sup>th</sup> and 75<sup>th</sup> quartiles, the vertical line inside the box indicates the median value, the whiskers extend from the ends of the box to the outermost data point that falls within 1.5 of the lower and upper quartiles and dots indicate outlier values.

### ***Phyllospadix* spp.**

*Phyllospadix* spp., surfgrass cover has been monitored at two sites (Fraser Cove and Trailer) on Santa Cruz Island since spring 1995, and at two sites (East Point and Northwest-Talcott) on Santa Rosa Island since spring 2002 (Figures 83-87 and Appendix C). The four sites were chosen for study based on the relatively high density of surfgrass habitat present when sites were established. *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 the two Santa Cruz Island sites, whereby surfgrass overstory cover has routinely declined in spring and increased in fall. In 2012, there was minimal seasonal variation in surfgrass cover at both sites (Figure 83). At Trailer, surfgrass cover continued to decrease slightly in overall abundance perpetuating a trend that has occurred during the last several years (Figures 84-85). At Fraser Cove, the opposite has occurred in which surfgrass cover has been increasing since 2007. Over time, *Phyllospadix* spp. cover has ranged approximately 45-75 % at Fraser Cove and approximately 50-80 % 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 cover on two transects 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 2012, surfgrass overstory cover at East Point remained stable both seasons relative to past years (Figure 83). At Northwest-Talcott, *Phyllospadix* decreased slightly in spring, but cover increased in fall to become comparable to abundances measured in recent years. As in the past, Transect-3 at Northwest-Talcott had markedly less surfgrass cover relative to the two other transects at the site.

Red algae, composed primarily of *Chondracanthus canaliculatus*, *Prionitis lanceolata*, and *Mazzaella affinis*, were relatively common on the three transects at both Fraser Cove and Trailer in 2012 (Figures 86-87). Red algae abundances averaged across the three transects at the two sites ranged approx. 15% to 25%. At Santa Rosa Island, red algae (mean ranged 1-6%) was less common (Figures 86-87).

The overall condition of surfgrass at the two sites on Santa Cruz and Santa Rosa Islands appeared to be healthy with only minimal cover of epiphytic algae (e.g. *Smithora naiadum* and *Melobesia mediocris*) and low to medium level of bleaching observed.

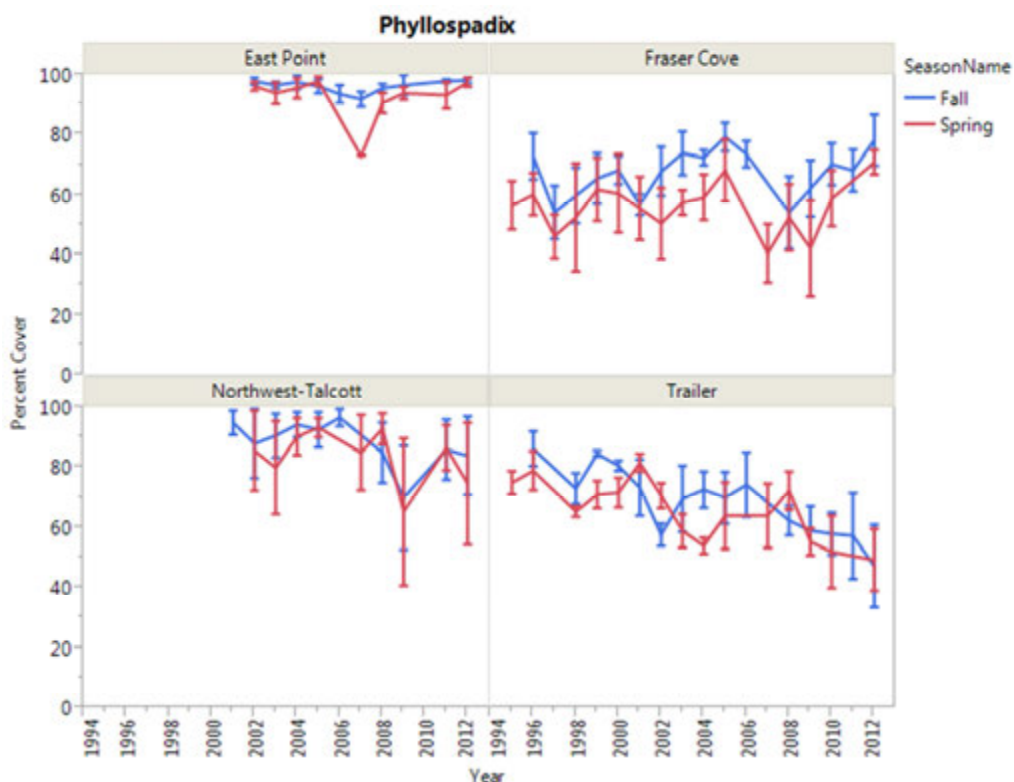


Figure 83. Mean percent cover of *Phyllospadix* spp. pooled across transects at each site.

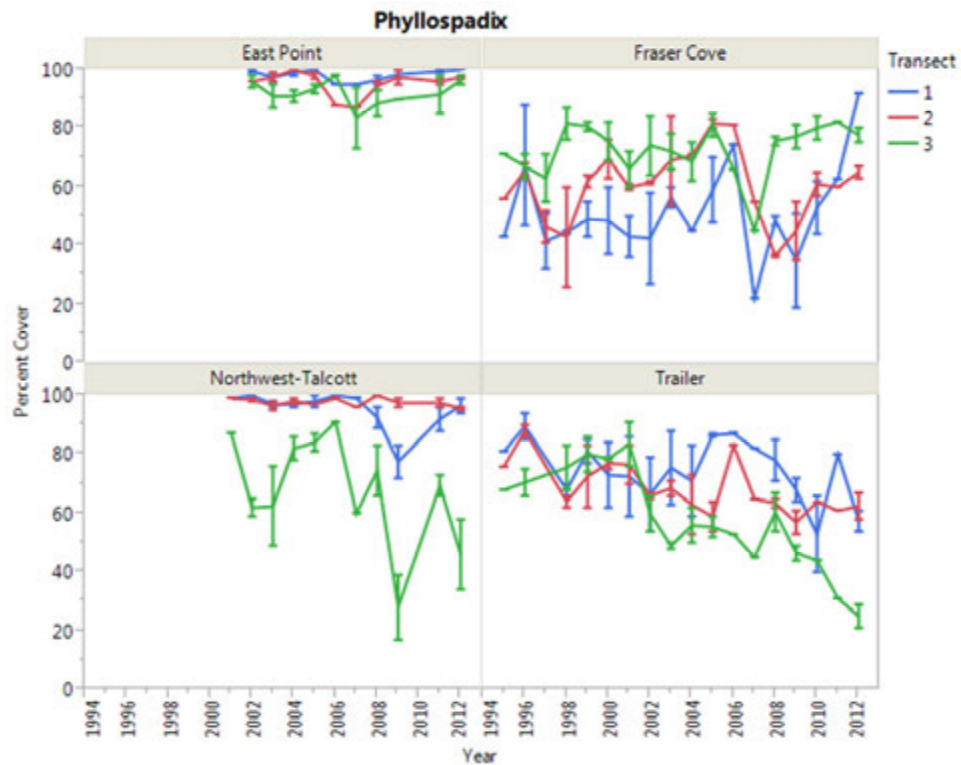


Figure 84. Mean percent cover of *Phyllospadix* spp. at each site.

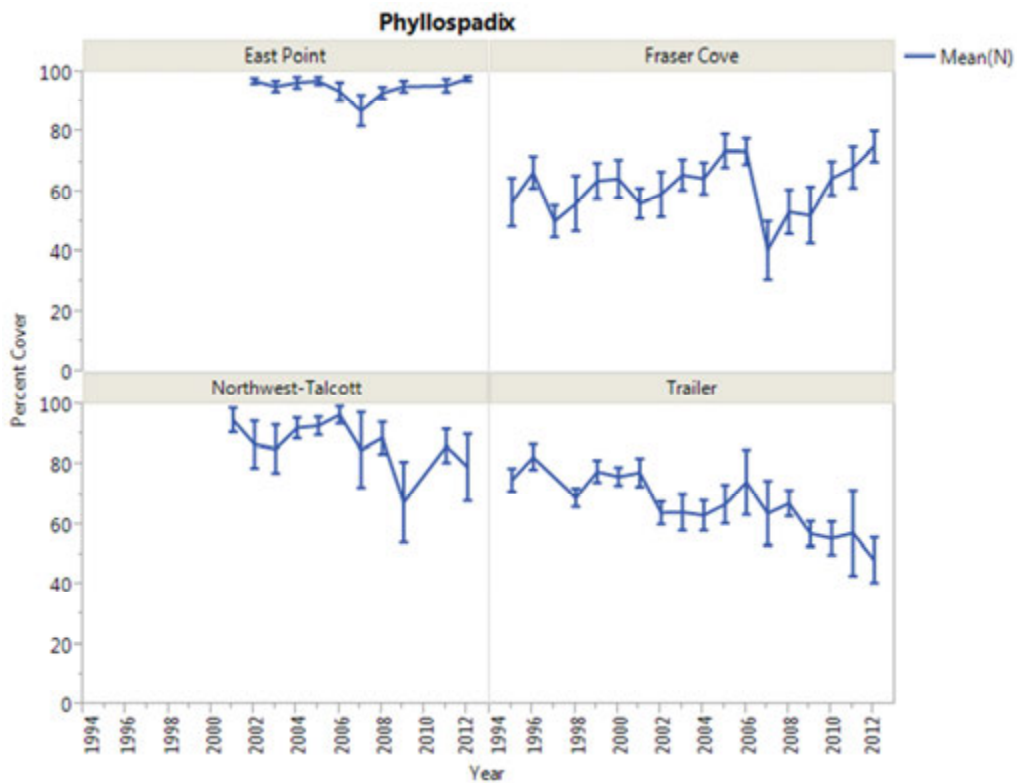


Figure 85. Mean percent cover of *Phyllospadix* spp. pooled across transects at each site.

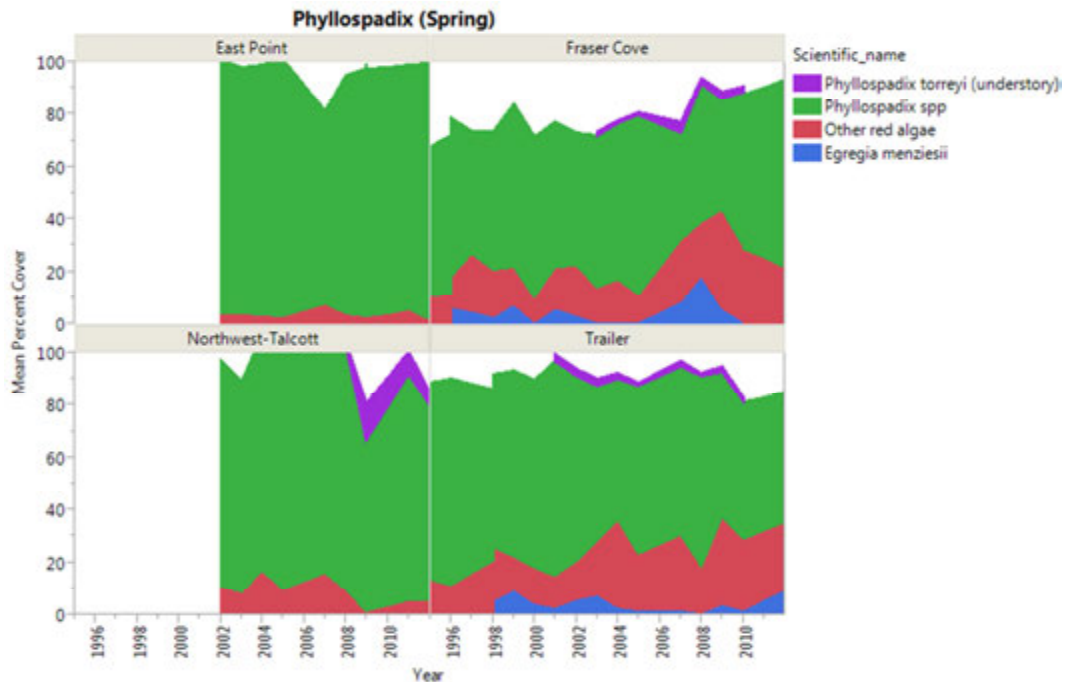


Figure 86. *Phyllospadix* spp. cover at all sites in spring. Colored areas represent the seasonal mean percent cover for *Phyllospadix* spp. and other dominant taxa from 10m point-intercept transects.

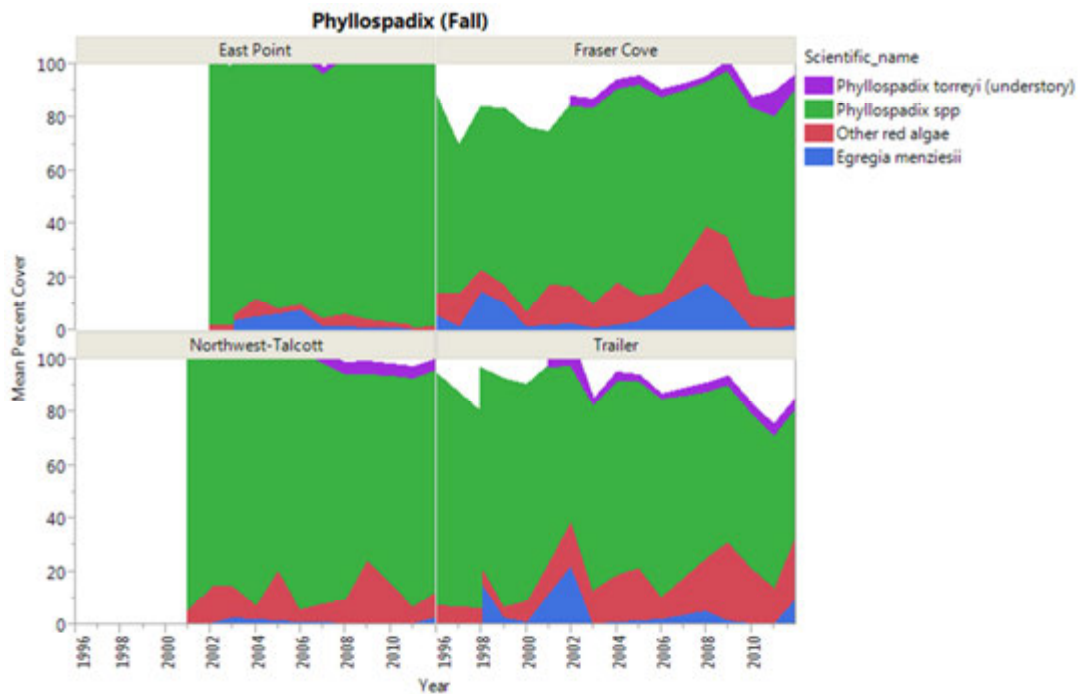


Figure 87. *Phyllospadix* spp. cover at all sites in fall. Colored areas represent the seasonal mean percent cover for *Phyllospadix* spp. and other dominant taxa from 10m point-intercept transects.

## Shorebirds and Pinnipeds

The maximum number of shorebirds and pinnipeds observed at any one time during a visit to the sites in 2012 is summarized in Tables 7 and 8. Overall, the abundances and diversity of shorebirds in 2012 at all sites appeared similar to observations made in recent years. Likewise, there were no marked changes to the abundances of pinnipeds observed in 2012.

Black oystercatchers were again the most ubiquitous shorebirds at the rocky intertidal sites. With the exception of one site (Cuyler Harbor), at least one black oystercatcher was present at each site during spring. In spring, a relatively large flock of 10 black oystercatchers was observed at Fraser Cove, and smaller flocks were seen at numerous other sites.

American oystercatchers have gradually become more common at the islands in recent years. In 2012, one American oystercatcher was sighted at South Frenchy's Cove in spring, and another was seen at Cat Rock in fall. The birds were not seen at other sites.

Black turnstones were not common in 2012 like they have been in recent years. Four black turnstones were observed at Crook Point in spring, but the birds were not seen at any other sites during the year. For reference, last year, turnstones were present at three out of eight sites (Ford Point, Fossil Reef and Northwest-Talcott) sampled in spring. Abundances ranged 2-12 individuals per site. In fall, 2-16 turnstones were seen at eight sites (Crook Point, Cuyler Harbor, Fossil Reef, Johnson's Lee, Landing Cove, Northwest-Talcott, Orizaba Cove and Sea Lion Rookery).

Less common shorebirds such as wandering tattlers and willets are occasionally seen on the reefs while black-bellied plovers and snowy plovers usually inhabit adjacent beaches. Seabirds such as cormorants, gulls, pelicans and occasionally pigeon guillemots, are sometimes observed resting on the reef or hunting in the nearshore zone.

Abundances of gulls often vary widely spatially and temporally. Less than 10 gulls (primarily western gulls) are typically seen at most sites. When large groups of gulls are observed they are normally just resting on the reef, whereas smaller groups and individuals are sometimes witnessed feeding. In 2012, gulls were more common than usual; flocks (30-35 gulls) were seen at Anacapa Middle West, Fossil Reef and Northwest-Talcott in spring. Additionally, 1-12 gulls were seen at several other sites surveyed in spring and most sites visited in the fall.

Cormorant numbers also tend to fluctuate in space and time. When present, they are typically not abundant. However, it is not uncommon to encounter several dozen cormorants at some sites such as East Point and Crook Point (common roosting locations) in fall. This year, 21 cormorants were seen at East Point in spring. A few other sites had 1-2 cormorants present in spring.

While not generally considered shorebirds, black phoebes and song sparrows are commonly seen catching flies on the shore while common ravens are primarily scavenging for dead animals washed ashore. Ravens and gulls have both been observed foraging in the mussel beds and other intertidal areas for invertebrates.

Harbor seals, *Phoca vitulina*, were observed at or within the immediate vicinity of 5 out of the 15 sites (Fossil Reef, Harris Point, Johnson's Lee, Anacapa Middle West and Otter Harbor) sampled in spring. In fall, only one harbor seal was seen at a site (Fraser Cove).

Northern elephant seals, *Mirounga angustirostris*, usually prefer sandy beaches over rocky shelves to haul out. They are common sights on beaches near Cuyler Harbor, Crook Point, and Fossil Reef in spring where we typically observe weaned pups that have not yet gone to sea or adults coming ashore to molt. In 2012, elephant seals were seen at or nearby Crook Point, Cuyler Harbor, Ford Point, Fossil Reef, Johnson's Lee and Otter Harbor; elephant seals were not observed in fall.

California sealions, *Zalophus californianus*, were abundant (approximately 200) at the aptly named, Sea Lion Rookery on Santa Barbara Island as well as the other site (Landing Cove) sampled on the island. One sea lion was also seen nearby Otter Harbor in spring.

Table 7. Shorebirds and pinnipeds most commonly encountered at monitoring sites in spring 2012 (maximum seen at any one time)

| Site Code                   | Species Code |      |      |      |      |      |      |      |      |      |     |
|-----------------------------|--------------|------|------|------|------|------|------|------|------|------|-----|
|                             | AMOY         | BLOY | BLTU | CASL | CORM | ELSE | GULL | HASE | WATA | WEGU | All |
| <b>Crook Point</b>          | .            | 3    | 4    | .    | 1    | 7    | 3    | 1    | 1    | 1    | 18  |
| <b>Cuyler Harbor</b>        | .            | .    | .    | .    | .    | 1    | .    | .    | .    | .    | 1   |
| <b>East Point</b>           | .            | 6    | .    | .    | 21   | .    | .    | .    | .    | 2    | 29  |
| <b>Ford Point</b>           | .            | 5    | .    | .    | .    | .5   | .    | .    | .    | .    | 10  |
| <b>Forney's</b>             | .            | 4    | .    | .    | .    | .    | .    | .    | .    | .    | 4   |
| <b>Fossil Reef</b>          | .            | 4    | .    | .    | 2    | 2    | .    | 11   | .    | 30   | 49  |
| <b>Fraser Cove</b>          | .            | 10   | .    | .    | .    | .    | .    | .    | .    | .    | 10  |
| <b>Harris Point</b>         | .            | 3    | .    | .    | .    | .    | .    | 5    | .    | .    | 8   |
| <b>Johnson's Lee</b>        | .            | 6    | .    | .    | .    | 15   | .    | 2    | .    | 2    | 25  |
| <b>Middle-West</b>          | .            | 7    | .    | .    | .    | .    | 30   | 3    | 2    | .    | 42  |
| <b>Northwest-Talcott</b>    | .            | 4    | .    | .    | .    | .    | .    | .    | .    | 35   | 39  |
| <b>Otter Harbor</b>         | .            | 6    | .    | 1    | 1    | 1    | 5    | 20   | .    | .    | 34  |
| <b>South Frenchy's Cove</b> | 1            | 6    | .    | .    | .    | .    | .    | .    | .    | 1    | 8   |
| <b>Trailer</b>              | .            | 1    | .    | .    | .    | .    | .    | .    | .    | .    | 1   |
| <b>Willows Anchorage</b>    | .            | 8    | .    | .    | .    | .    | .    | .    | .    | .    | 8   |
| <b>All</b>                  | 1            | 73   | 4    | 1    | 25   | 31   | 38   | 41   | 2    | 70   | 286 |

AMOY, American oystercatcher; BLOY, black oystercatcher; BLTU, black turnstone; CASL, California sea lion; CORM, cormorant; ELSE, elephant seal; GULL, generic gull; HASE, harbor seal; WATA, wandering tattler; WEGU, Western Gull

Table 8. Shorebirds and pinnipeds most commonly encountered at monitoring sites in fall 2012 (maximum seen at any one time)

| Site Code                   | Species Code |      |      |      |      |     |
|-----------------------------|--------------|------|------|------|------|-----|
|                             | AMOY         | BLOY | CASL | HASE | WEGU | All |
| <b>Cat Rock</b>             | 1            | 4    | .    | .    | 1    | 6   |
| <b>Fraser Cove</b>          | .            | 4    | .    | 1    | .    | 5   |
| <b>Landing Cove</b>         | .            | .    | 26   | .    | 3    | 29  |
| <b>Prisoner's Harbor</b>    | .            | .    | .    | .    | 1    | 1   |
| <b>Scorpion Rock</b>        | .            | 4    | .    | .    | 1    | 5   |
| <b>Sea Lion Rookery</b>     | .            | 4    | 200  | .    | 12   | 216 |
| <b>South Frenchy's Cove</b> | .            | 2    | .    | .    | 1    | 3   |
| <b>Trailer</b>              | .            | 6    | .    | .    | .    | 6   |
| <b>Willows Anchorage</b>    | .            | .    | .    | .    | 1    | 1   |
| <b>All</b>                  | 1            | 24   | 226  | 1    | 20   | 272 |

AMOY, American oystercatcher; BLOY, black oystercatcher; CASL, California sea lion; HASE, harbor seal; WEGU, Western Gull

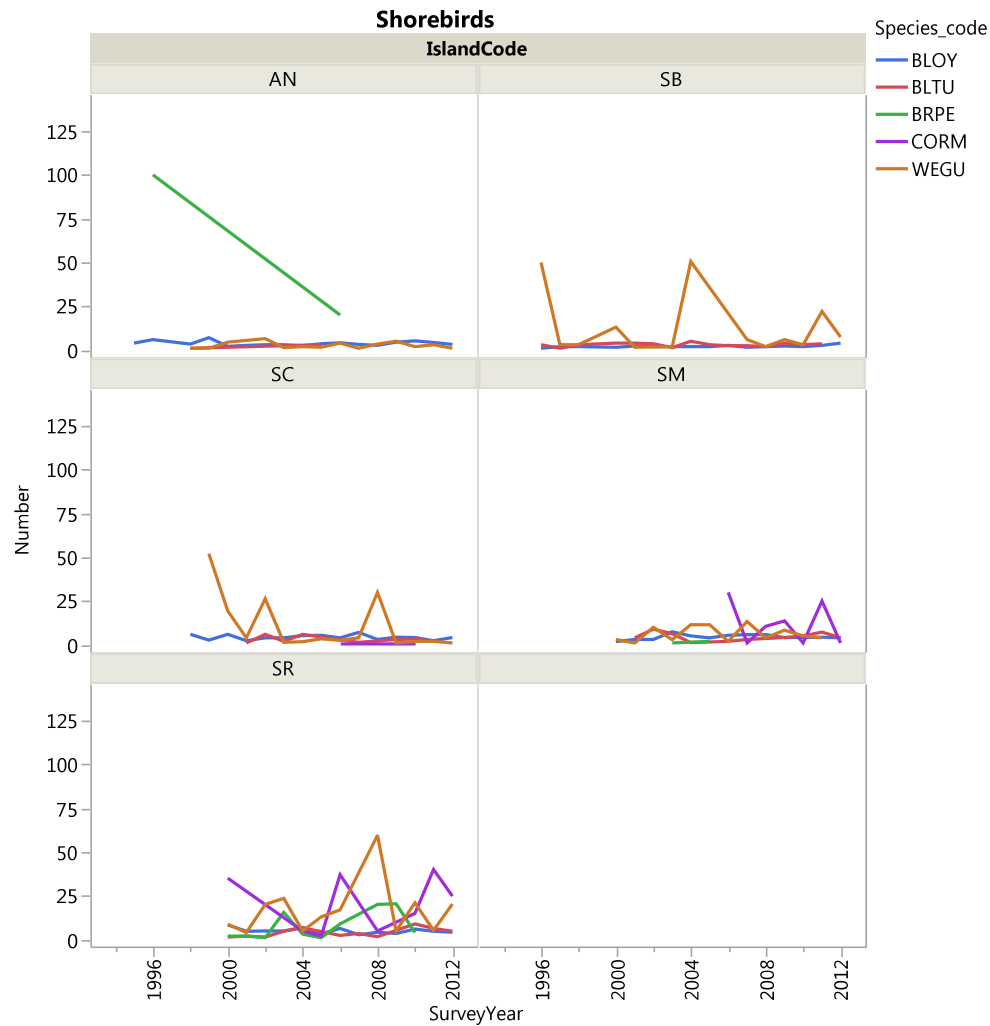


Figure 88. Mean number of shorebirds pooled across sites at each island. BLOY, black oystercatcher; BLTU, black turnstone; BRPE, brown pelican; CORM, cormorant; WEGU, western gull. AN, Anacapa Island; SB Santa Barbara Island; SC, Santa Cruz Island; SM, San Miguel Island; SR, Santa Rosa Island.

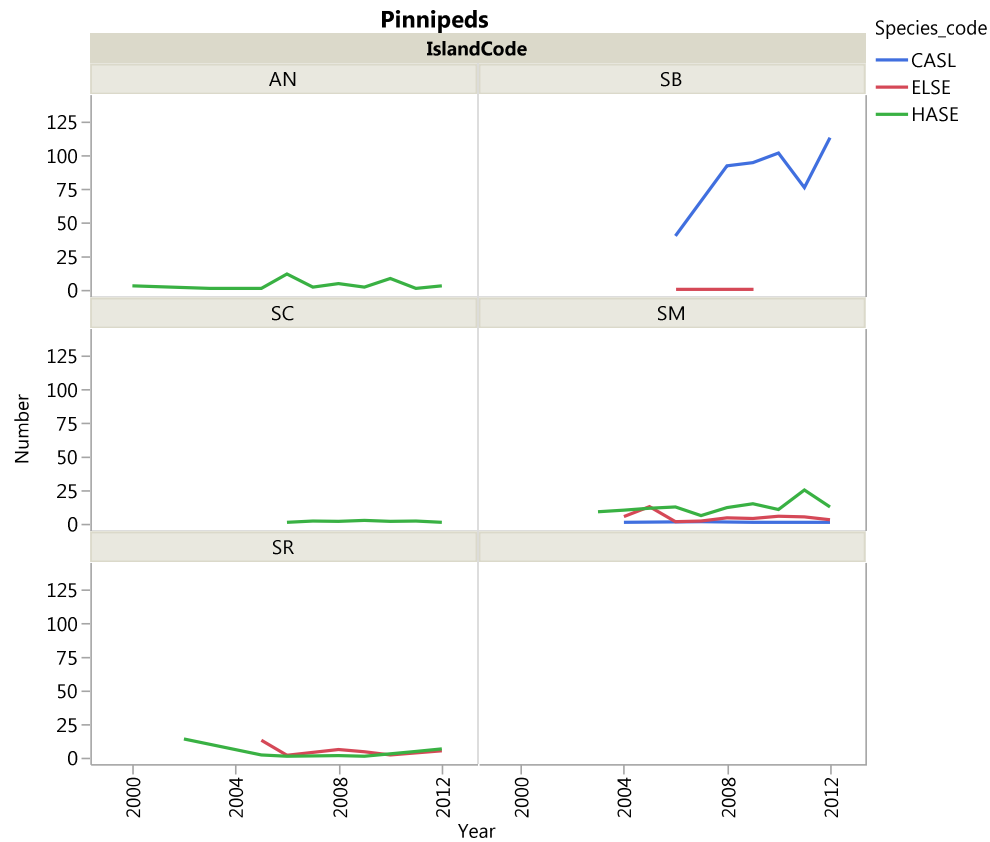


Figure 89. Mean number of pinnipeds pooled across sites at each island. CASL, California sea lion; ELSE, elephant seal; HASE, harbor seal. AN, Anacapa Island; SB Santa Barbara Island; SC, Santa Cruz Island; SM, San Miguel Island; SR, Santa Rosa Island.

## Visitation

Most visitors accessed the rocky intertidal at Frenchy's Cove, though some visitors also explored East Point and Prisoner's Harbor tidepools among other locations on Santa Rosa and Santa Cruz Islands, respectively. At South Frenchy's Cove and adjacent reefs, Island Packers Company conducts classroom programs for school groups, which combine oceanography and tidepooling typically during winter and spring months.

Visitation statistics for Frenchy's Cove are available from monthly reports based on concessionaire reporting from Island Packers Company and Truth Aquatics (Figures 90-91). No records are available for the number of private boaters that went ashore at any of the Channel Islands in the National Park. Additionally, there are no records for the number of visitors that accessed the intertidal zone at East Point or Prisoner's Harbor.

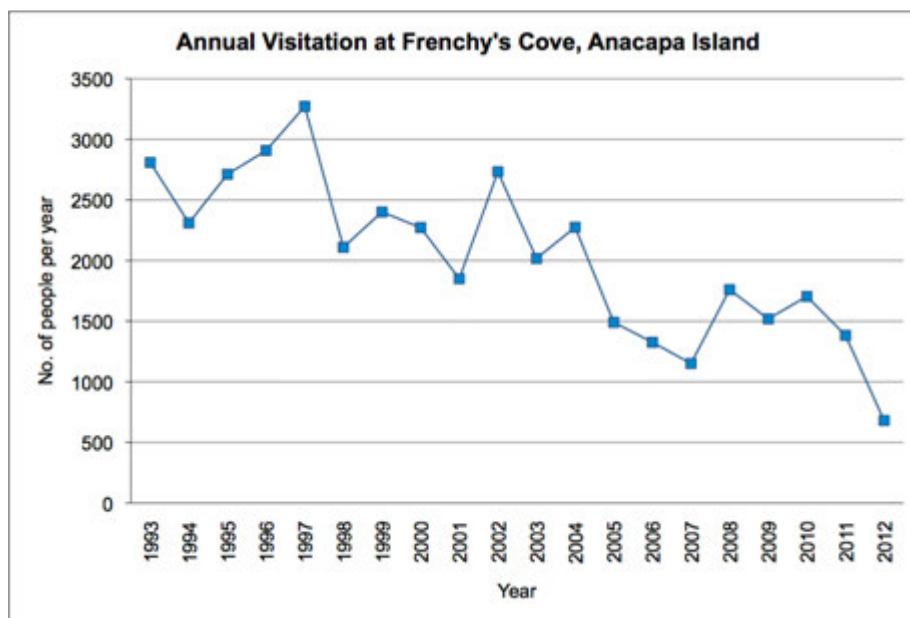


Figure 90. Annual commercial visitation at Frenchy's Cove, Anacapa (Island Packers Company).

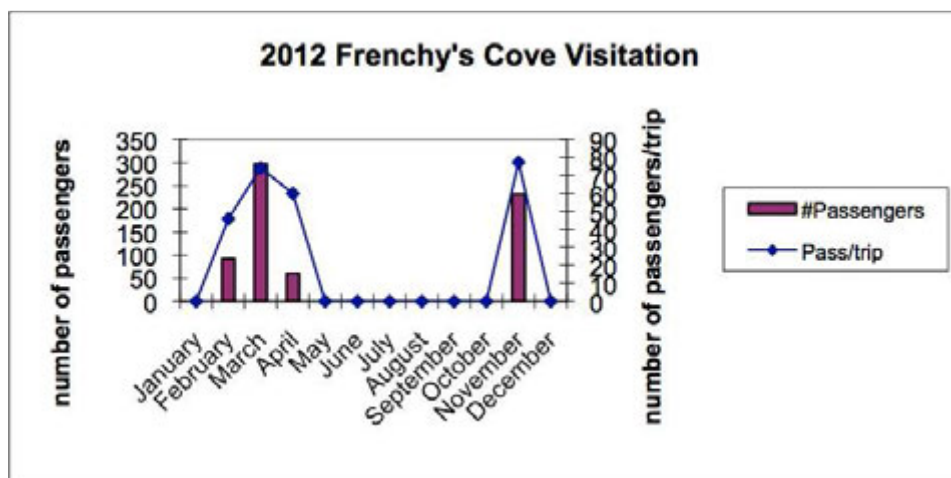


Figure 91. Monthly visitation at Frenchy's Cove, Anacapa Island (via Island Packers Company)

The total number of visitors from concession boats in 2012 was 681 passengers in 10 trips (Table 9). This was markedly less than the number of visitors in 2011 (1383) and 2010 (1704) (Figure 90). In fact, visitation in 2012 was the lowest year since record keeping initiated in 1993. March was again the top month for visitation with 297 passengers on 4 trips. Sixty-six percent of the visitation occurred in spring (February-May). No visitation by concession boats occurred from May to October and December.

Table 9. Visitors to South Frenchy's Cove, Anacapa Island in 2012 (Island Packers)

| <b>YEAR</b> | <b>MONTH</b> | <b>#Passengers</b> | <b>#TRIPS</b> |
|-------------|--------------|--------------------|---------------|
| 2012        | January      | 0                  | 0             |
| 2012        | February     | 92                 | 2             |
| 2012        | March        | 297                | 4             |
| 2012        | April        | 60                 | 1             |
| 2012        | May          | 0                  | 0             |
| 2012        | June         | 0                  | 0             |
| 2012        | July         | 0                  | 0             |
| 2012        | August       | 0                  | 0             |
| 2012        | September    | 0                  | 0             |
| 2012        | October      | 0                  | 0             |
| 2012        | November     | 232                | 3             |
| 2012        | December     | 0                  | 0             |
| <b>2012</b> | <b>Total</b> | <b>681</b>         | <b>10</b>     |



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## Appendix A. Trip Reports

The following are trip reports from the Rocky Intertidal Monitoring 2012 field season (March 2012 through January 2013). Reports were prepared by Stephen Whitaker and 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.

### **San Miguel Island, March 13-20, 2012**

(Database event #2012-A)

Prepared by Stephen Whitaker

**PURPOSE:** To conduct standard intertidal monitoring protocols at the four sites located on Santa Miguel Island.

**PERSONNEL:** Stephen Whitaker, Bio-tech, Channel Islands National Park  
Andrew Domingos, Bio-tech, CINP  
Nathanial Fletcher, UCSC-PISCO  
Dan Orr, UCSC-PISCO

**PROCEDURE and general observations:** We flew out to the ranger station on 3/13. Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Photoplots were scored in the field. Thirty-minute searches were conducted to count seastars and black abalone at all sites except Crook Point. Note that more than 30 minutes were dedicated to searching and measuring abalone at Otter Harbor. The maximum number of shorebirds and pinnipeds observed at each site was recorded. Nate and Dan from UCSC-PISCO joined the tour to monitor the long-term biodiversity transects at Crook Point and Cuyler Harbor.

**13 March 2012, Cardwell Point.** Conditions were good overall with light to medium winds out of northwest. The plane landed on San Miguel Island in the afternoon following low tide. A hike to Cardwell Point was conducted to survey the elephant seal population utilizing the location. Approximately 125 elephant seal pups and 25 dead pups were seen at the north-facing cove. The number of seals was not estimated at the south-facing beaches nearby Cardwell Point but several adult males were seen.

**14 March 2012, Cuyler Harbor.** Low tide 0.2 ft at 1040 hrs. Conditions were completely workable despite the moderate-sized long-period swell (2-3' NW) in the water. Wind was light (<5mph). No shorebirds were observed at the site upon arrival, but one elephant seal pup was noticed near the low tide zone in the center of the site at approximately 1100 and remained while monitoring was conducted. The walk along Cuyler Beach was too dark in the morning to make shorebird observations, but approximately 35 elephant seal pups were seen on beach adjacent to the site. We accessed the site by hiking up and over the surge channel via the bluff.

Stephen and Andrew marked all plots with yellow plot indicators then photographed plots and panoramas. Plots were then scored by Stephen with Andrew recording. Andrew searched for sea stars (35 *Pisaster ochraceus*/ 30 minutes) and measured all individuals (n=35, range=50-170mm, weak modes at 80mm and 120mm) at the site. Stephen searched for black abalone throughout site, but found zero individuals. Nate and Dan monitored half the biodiversity transects at the site and counted motile invertebrates at the mid-tidal level along several transects. Work was performed from 0710 to 1320. Several plots were repaired before leaving.

Barnacle cover averaged 37% and mean *Endocladia* cover was 25% in the barnacle plots. *Endocladia* plots had 44% mean *Endocladia* cover. *Silvetia* was only present (mean=18%) in two rockweed plots. *Mytilus* plots had 70% mean mussel cover and 6% mean *Phragmatopoma* cover among other less dominant taxa. Dan found two *Nucella canaliculata* shells inhabited by *Pagurus*.

**15 March 2012, Crook Point.** Low tide 0.0 ft at 1206 hrs. Conditions were marginally workable due to powerful sets of long period south swell (5-7') that regularly washed over entire outer reef all day including during low tide. Wind was 15-20 mph when we arrived and gradually increased during the afternoon. Thick fog bank swept ashore around 1400. There were 3 western gulls, 1 cormorant, 3 black oystercatchers, 4 black turnstones, and 7 elephant seals at or near the site upon arrival. Seventeen seals were present on the beach adjacently located east of the site. Approximately 12 cormorants were seen about 100m offshore. One commercial fishing vessel worked near Wyckoff Ledge the entire time we were on site (0850-1430). The temperature logger was not downloaded on this trip but was downloaded the following day.

Stephen and Andrew marked and photographed all plots and panoramas on the inside reef before moving to the outside reef to do the same for the remaining plots. Stephen then scored all plots with Andrew recording. The swell created hazardous conditions for sampling black abalone and sea stars, so those searches were not conducted. PISCO sampled 6/11 biodiversity transects at the site but were unable to complete the lower portions of the lines due to wave energy. Repairs were made to several plots before departing.

Barnacle plots had 39% mean *Balanus/Chthamalus* cover. The majority of space in all five plots was unoccupied bare rock. *Endocladia* plots averaged 24% *Endocladia*. Plot 387 was occupied by a relatively diverse community of algae and plot 389 had 60% *Mytilus*. *Silvetia* was absent from the representative plots but plot 400 had 30% *Hesperophycus*. Mussels were common in *Silvetia* plots (mean=24%). Plot 397 was 81% *Mytilus*. Mussels averaged 82% in the *Mytilus* zone. Numerous sipunculids were seen while cleaning plot corners in the mussel zone.

Stephen's observations of the reef: no change from last visit in December 2011, normal overall. *Cladophora* and *Ulva* common on outer reef, small tufts of *Anelipes japonica* scattered throughout outer reef. *Codium fragile* and *C. setchellii* present. *Pollicipes*, *Anthopleura xanthogrammica* and *Dodecaceria* common. Abundant large *Mytilus* present on outer reef. Rockweed is scarce and composed primarily of *Hesperophycus* (small Harris Point form).

**16 March 2012, Harris Point.** Low tide -0.2 ft at 1311 hrs. Conditions were conducive to sampling despite the moderate-sized swell (5-7') running out of northwest. Wind remained light all day. Many of the plots were wetted frequently when we arrived at 1000 but all were dry at low tide. There were three black oystercatchers and 5 harbor seals present when we arrived. Approximately 70 cormorants were seen on the islet west of the site and approximately 100 scoters were counted in the cove. Pigeon guillemots were heard in the cove. We departed the site at 1630.

All photoplots and panoramas were shot by Andrew and Stephen. Stephen scored photoplots with Andrew recording. Andrew counted sea stars for 30 minutes finding 31 *Pisaster ochraceus*, 1 *Patiria miniata* and 1 *Pisaster giganteus* throughout the site. Stephen searched for black abalone for the same amount of time and located ten individuals ranging 74-160mm in size. Four abalone were located <5m from each other; all other individuals were spread out. One individual (approx. 120mm) was observed in plot 443 and one was in the crevice transect. Repairs were made to corners on numerous plots. However, it was later noted during the fall sample for 2012 that plot 434 was incorrectly positioned. The UR and LR plot markers were mistaken for UL and LL and new plot markers were placed in the rock. The mistake was corrected during the fall 2012 visit to the site and photo plot cover data were removed from the database.

Barnacles (primarily *Balanus* spp.) averaged 76% in the representative plots. Mean *Endocladia* cover in the representative plots was 45%. Barnacle cover was moderately high (14%) in the *Endocladia* plots. *Hesperophycus* plots were primarily dominated by 42% mean *Hesperophycus*, 25% *Endocladia* and 5% barnacle cover. *Mytilus* plots mostly had 28% mean mussel cover, 7% non-coralline crust, 6% *Tetraclita* and 5% mean *Balanus/ Chthamalus* cover. *Tetraclita* plots were mostly colonized by 23% mean mussel, 14% mean non-coralline, 10% mean *Tetraclita* and 6% mean articulated cover.

**17 March 2012, Cuyler Harbor.** Low tide -0.3 ft at 1359 hrs. Conditions were poor due to powerful swell (4-6' NW) and high wind (20-30mph NW) caused by low pressure system located over southern California. Several squalls passed over during the course of our sampling. No shorebirds or pinnipeds were observed at the site upon arrival. The following were seen walking to the site: approx. 260 elephant seal pups on beach, 1 harbor seal pup (with umbilicus) on beach and mother in water, approx. 150 surf scoters in harbor, approx. 500 gulls around channel, 2 black oystercatchers on beach and approx. 25 whimbrels on beach.

The purpose of the visit was to assist the PISCO team sample the biodiversity transects. Dan and Nate set up the transects and scored percent cover of sessile species. Stephen counted motile species in quadrats along the transects with Andrew recording. Stephen also counted and measured sea stars along the transects. Nearly all the transects at the site were completed.

**18 March 2012, Simonton Beach.** Conditions were marginal for intertidal sampling due to high wind and swell generated from low pressure system moving through the region. Several squalls passed over the island during the day.

The beach at Simonton was sampled from 1145 to 1300 for carcasses, trash, birds and pinnipeds. Dan and Nate from PISCO joined Andrew and Stephen for the survey. The area surveyed included the expanse of beach between Harris Point and the first cove encountered to the west. Forty-nine elephant seals (all pups except one bull), approximately 20 gulls and 7 black oystercatchers were present on the beach. An unidentified piece of tissue more than 14' in length was encountered likely remnants of a dead whale. One dead elephant seal pup and two dead birds were also seen during the survey. The following were counted as debris present between the waterline and the splash zone: 195 bottle caps, 45 plastic containers, 1,606 plastic fragments (sizes ranged 1 sq in to 1 sq ft), 59 pieces of fishing gear (includes buoys and line), 5 pieces of glass, 20 pieces of lumber, 420 pieces of Styrofoam (sizes were mostly <1 sq in), 11 pieces of rubber (included balls and wet suit fragments), 3 pieces of clothing.

**19 March 2012, Otter Harbor.** Low tide -0.3 ft at 1512 hrs. Conditions were amenable for working the entire site with the exception of OR1-3 during the black abalone search. Swell/surge was moderate-sized (4-5') and northwest wind was 15mph upon arrival gradually increasing throughout the afternoon. The storm that passed through the region during the past several days deposited slightly less than an inch of precipitation. From the bluff above the site, 1 cormorant, 5 gulls, 6 black oystercatchers, 1 California sea lion pup, 18 harbor seals (including 2 pups) and 1 elephant seal pup were observed at the site. Additionally 8 gulls were seen on the bluff above the site and at least 6 harbor seals were in the water nearby the outer reefs. The tolerant harbor seal that has been encountered at this site during past visits was present during the entire monitoring period. Stephen and Andrew arrived at the site at 1045 but were unable to commence work until 1200. Both departed the site at 1815.

Stephen and Andrew photographed plots and panoramas then Stephen scored plots with Andrew recording. Andrew searched for sea stars (113 *Pisaster ochraceus*/ 30 minutes) and measured 61 individuals (range=80-190mm, mode=150mm). Stephen measured black abalone (n=109) throughout the entire site with the exception of OR1-3 at the east end of the site due to wave energy. Most individuals were either touching or located 1-10cm from another individual and sizes ranged 60-170mm. No repairs were necessary.

Mean barnacle cover was 47% in the barnacle plots. Plot 374 has been dominated by red algae for many years and continues to be composed primarily of *Chondracanthus* and *Mazzaella*. *Endocladia* plots had 49% mean *Endocladia* cover along with scant abundances of other taxa. *Silvetia* plots only had *Silvetia* present in two plots (4% in both). The rockweed plots were instead dominated by 27% barnacle, 29% *Endocladia* and 6% *Mazzaella* cover. *Mytilus* plots had 43% mussels, 11% non-coralline crust, 10% articulated corallines, 9% *Pollicipes* and 5% coralline crusts among other less common taxa.

Dan and Nate from PISCO revisited Cuyler Harbor to complete monitoring of long-term biodiversity transects.

**20 March 2012,** Flew off the island to Ventura.

Table 10. *Haliotis cracherodii* (black abalone) counts at Cuyler Harbor, Crook Point, Harris Point, and Otter Harbor, San Miguel Island, Spring 2012.

| Site          | Count Random | Count Density | Area   | Density | Count Sized | Mean Size | StDev | Min Size | Max Size | %<45mm | %45-126mm | %127-145mm | %>145mm |
|---------------|--------------|---------------|--------|---------|-------------|-----------|-------|----------|----------|--------|-----------|------------|---------|
| Cuyler Harbor | 0            | 0             |        | .000    | 0           |           |       |          |          | -      | -         | -          | -       |
| Harris Point  | 7            | 1             | 26.500 | .038    | 8           | 122.00    | 25.57 | 84       | 160      | -      | 50.00%    | 37.50%     | 12.50%  |
| Otter Harbor  | 109          | 0             | 20.600 | .000    | 109         | 107.57    | 22.53 | 50       | 170      | -      | 83.49%    | 8.26%      | 8.26%   |

Table 11. Photoplot summary – mean percent cover by zone at San Miguel Island, spring 2012 (5 plots/zone).

| Site   | ZoneName      | Bare Rock | Barnacle | Tetraclita | Endocladia | Hesperophycus | Silvetia | Mussels | Turfweed | Leaf Barnacle | Misc Algae | Misc Animal | Tar | Other |
|--------|---------------|-----------|----------|------------|------------|---------------|----------|---------|----------|---------------|------------|-------------|-----|-------|
| Cuyler | Barnacle      | 37.8      | 37.0     | 0.0        | 24.6       | 0.0           | 0.0      | 0.0     | 0.0      | 0.0           | 0.6        | 0.0         | 0.0 | 0.0   |
| Cuyler | Endocladia    | 25.6      | 3.4      | 0.8        | 43.8       | 0.0           | 7.8      | 11.2    | 0.0      | 0.2           | 5.8        | 1.4         | 0.0 | 0.0   |
| Cuyler | Rockweed      | 33.2      | 8.0      | 2.8        | 16.8       | 0.0           | 17.8     | 4.8     | 1.8      | 0.2           | 7.8        | 6.6         | 0.0 | 0.0   |
| Cuyler | Mussels       | 10.4      | 0.0      | 4.6        | 0.0        | 0.0           | 0.0      | 69.8    | 0.4      | 5.0           | 1.2        | 8.6         | 0.0 | 0.0   |
| Crook  | Barnacle      | 55.6      | 38.6     | 0.0        | 4.6        | 0.0           | 0.0      | 0.6     | 0.4      | 0.0           | 0.0        | 0.2         | 0.0 | 0.0   |
| Crook  | Endocladia    | 34.4      | 11.2     | 0.0        | 24.2       | 0.2           | 0.0      | 13.8    | 0.2      | 1.0           | 13.6       | 1.4         | 0.0 | 0.0   |
| Crook  | Rockweed      | 16.8      | 10.6     | 0.0        | 17.8       | 6.4           | 0.0      | 24.8    | 2.6      | 1.4           | 18.8       | 0.8         | 0.0 | 0.0   |
| Crook  | Mussels       | 9.2       | 0.4      | 0.4        | 0.0        | 0.0           | 0.0      | 82.2    | 0.0      | 1.8           | 5.0        | 0.8         | 0.0 | 0.2   |
| Harris | Barnacle      | 18.6      | 76.4     | 0.0        | 3.0        | 0.0           | 0.0      | 0.0     | 0.0      | 0.0           | 0.0        | 0.2         | 1.8 | 0.0   |
| Harris | Endocladia    | 29.0      | 14.4     | 0.2        | 44.8       | 1.8           | 0.0      | 2.4     | 0.2      | 0.0           | 6.4        | 0.8         | 0.0 | 0.0   |
| Harris | Mussels       | 38.0      | 5.2      | 4.2        | 6.0        | 0.2           | 0.0      | 29.2    | 0.2      | 0.6           | 14.2       | 1.8         | 0.4 | 0.0   |
| Harris | Tetraclita    | 34.6      | 1.6      | 10.0       | 2.8        | 0.0           | 0.0      | 23.6    | 0.8      | 0.4           | 22.4       | 3.8         | 0.0 | 0.0   |
| Harris | Hesperophycus | 23.2      | 5.0      | 2.2        | 24.6       | 42.6          | 0.0      | 0.0     | 0.0      | 0.0           | 2.0        | 0.4         | 0.0 | 0.0   |
| Otter  | Barnacle      | 30.6      | 43.4     | 0.0        | 0.0        | 0.0           | 0.0      | 0.0     | 8.4      | 0.0           | 15.4       | 0.4         | 1.8 | 0.0   |
| Otter  | Endocladia    | 32.6      | 4.4      | 1.4        | 49.0       | 0.2           | 0.4      | 1.0     | 0.2      | 0.2           | 10.0       | 0.6         | 0.0 | 0.0   |
| Otter  | Rockweed      | 29.8      | 26.4     | 0.4        | 28.8       | 0.4           | 1.6      | 0.2     | 0.0      | 0.0           | 10.6       | 1.2         | 0.6 | 0.0   |
| Otter  | Mussels       | 13.2      | 0.0      | 2.8        | 2.4        | 0.0           | 0.0      | 43.0    | 0.2      | 8.8           | 27.8       | 1.8         | 0.0 | 0.0   |

## **Santa Rosa Island, April 10-17, 2012**

(Database event #2012-B)

Prepared by Stephen Whitaker

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

**PERSONNEL:** Dan Richards, Marine Biologist, Channel Islands National Park  
Stephen Whitaker, Bio-tech, CINP  
Andrew Domingos, Bio-tech, CINP  
Joshua Sprague, Bio-tech, CINP

**PROCEDURE and general observations:** Park boat transportation was utilized to access the island on 4/10. Standard procedures were used for monitoring rocky intertidal sites. Due to inclement weather and a high number of harbor seals present at Northwest-Talcott only three sites (East Point, Fossil Reef and Johnson's Lee) were sampled. Plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Photoplots were scored in the field. Sea stars and black abalone were counted at 3/5 sites and surfgrass transects were read at East Point. *Lottia gigantea* and motile invertebrates were not sampled this season since counts and measurements were obtained during the last visit in January 2012. The maximum number of shorebirds and pinnipeds observed at each of the three sites sampled was recorded. Hobotemp Tidbit temperature loggers were downloaded at Johnson's Lee and Fossil Reef. Mussel sizes and mussel bed depth were measured at Johnson's Lee, East Point and Northwest Talcott last fall. Channel Islands Aviation provided transportation off the island on 4/17 because the Park boating division cancelled routine transportation to Santa Rosa Island for the week.

**4/10/12.** Most of the day was spent traveling to the island. Due to forecasted rain in the evening, a truck was staged on the east side of Water Canyon in the event that the crossing became too wet for travel.

**4/11/12.** A significant amount of precipitation (1.4") was received on the island overnight making the roads unworthy for travel all day. Time was spent working indoors on computers primarily checking and entering motile invertebrate data collected last season.

**4/12/12. East Point.** Low tide -0.2 ft at 1011 hrs. The conditions were decent with partly cloudy sky, light wind and medium-sized swell. There were 21 cormorants, 2 western gulls and 6 back oystercatchers at the site upon arrival. More cormorants and gulls were seen offshore. One harbor seal and elephant seal remained in the water at the lower reaches of the site during sampling.

Dan scored all plots while Stephen, Andrew and Josh worked to photograph plots and make repairs. Bolts were added to three corners (UL, UR, LL) of numerous plots to make them more visible when locating during future visits. See the photodata log for details on which plot markers were improved. Surfgrass transects were sampled by Stephen with a ruler rather

than a transect tape since the tape was not included with the rest of sampling gear. Ordinarily, accuracy would decline significantly when sampling transects with a ruler rather than a tape especially since the transects were frequently immersed by waves, but surfgrass overstory cover was nearly 100 percent within each of the three transects. Therefore, percent cover of surfgrass was more easily estimated.

Dan counted and measured black abalone for a period of 30 minutes. Twenty-three abalone ranging approximately 60-160 mm in size were located throughout the site. Most individuals(14) were located 1-10 cm away from other abalone.

Andrew and Josh counted sea stars for 30-minutes finding 295 *Pisaster ochraceus* throughout the site and measuring approximately 100 individuals. Sizes ranged 30-170 mm with a mode equal to 90 mm.

Barnacle cover averaged 49.2% in the barnacle plots. Plot 577 had 52% *Endocladia*. *Endocladia* plots had 48% *Endocladia* cover along with 15.4% mean barnacle cover. *Hesperophycus* plots had 14.8% mean *Hesperophycus* cover, 46.4% mean *Endocladia* cover and 8.8% mean barnacle cover. *Silvetia* plots had 7% mean *Silvetia* cover though only three plots had any of the rockweed present. All *Silvetia* plots had high amounts of bare rock (54-74%). Mean *Endocladia* cover in the *Silvetia* zone was 8.2% and *Cladophora columbiana* cover was 7.2%. Mussel plots had 32.8% mean mussel cover, 42.2% *Phragmatopoma*, and 4.4% articulated corallines.

**4/13/12.** The threat of rain all day meant vehicles would not be allowed on the roads. Time was spent working indoors on computers primarily on motile invertebrate data entry and QA/QC as well as the 2011 annual report.

**4/14/12.** Slightly more than 0.5" of precipitation wetted the island overnight which combined with the rain from earlier in the week made most of the roads too wet for travel again today. Travel was permitted out to East Point, so Dan joined Kathryn's group to assist the rare plant surveys. Others worked indoors on computer-related tasks.

**4/15/12. Northwest-Talcott.** More than 20 harbor seals including several young pups were present on the reef. The decision was made to cancel routine monitoring at the site this trip to avoid disturbance to the pinnipeds.

**Fossil Reef.** Low tide 0.1 ft at 1320 hrs. Water temperature was 12.4°C and air was 13.9°C.

Conditions were good for sampling since swell and surge were light (2-4'). Wind (10-15 knots) blew out of northwest. Sky was clear.

Eleven harbor seals including three pups and their mothers were observed moving off the reef upon arrival on the bluff. Two young elephant seals resided at the base of the cliff near the staging area the entire monitoring period. Five elephant seals were seen on the beach

adjacently located to the west. Thirty western gulls, 2 cormorants and 4 black oystercatchers were on reef at arrival.

Dan scored plots while Stephen, Andrew and Josh worked to photograph plots and make repairs. Bolts were added to three corners (UL, UR, LL) of numerous plots to make them more visible when locating during future visits. See the photodata log for details on which plot markers were improved. The temperature logger was successfully down loaded.

Dan counted and measured black abalone for a period of 30 minutes. Eighteen abalone ranging approximately 70-150 mm in size were located throughout the site. All individuals were located 1-5 m or further away from other abalone.

Andrew and Josh counted sea stars for 30-minutes finding 228 *Pisaster ochraceus* throughout the site and measuring approximately 100 individuals. Sizes ranged 40-140 mm with a mode equal to 80 mm.

Mean barnacle cover was 34.6% in the barnacle zone. Plot 607 had 18% *Endocladia*. *Endocladia* averaged 50.6% in the representative zone. Mean *Silvetia* cover measured 24.2% across the five *Endocladia* plots and was 68% in plot 611. *Silvetia* averaged 81.2% in the *Silvetia* zone. *Mytilus* cover was low in the mussel plots; only plot 623 had mussels present (2%). The mussel plots were relatively diverse with most space occupied by *Ulva* (mean=16.2%), coralline crusts (mean=14.6%), *Phragmatopoma* (mean=10.4%), articulated corallines (mean=9.4%) and *Gelidium coulteri* (mean=6.8%).

**4/16/12. Johnson's Lee.** Low tide 0.2 ft at 1400 hrs. Water temperature was 13.9 °C and air was 15.9 °C. Tide was only marginal, but conditions were quite workable due to small surf (1-2') and calm wind.

There were 15 elephant seals lounging on the sand and in the pool located near the center of the site. Two harbor seals (mother and pup) that were tucked under a ledge near the elephant seals fled the site upon arrival. More elephant seals were present on the beaches between the site and South Point than usually seen. Birds on the reef included about 2 western gulls and 6 black oystercatchers.

The sand level at the site was high with the back cobble area mostly covered and the front of the reef slightly inundated with sand.

Dan scored plots while Stephen, Andrew and Josh worked to photograph plots and make repairs. Bolts were added to three corners (UL, UR, LL) of numerous plots to make them more visible when locating during future visits. See the photodata log for details on which plot markers were improved. The temperature logger was successfully down loaded.

Barnacle plots averaged 47.8% barnacle cover. Plot 503 had 37% *Endocladia*. *Endocladia* plots averaged 17.2% *Endocladia* and 14.4% mussel cover; most of the remaining space was

unoccupied bare rock. Mussel cover averaged 10.2% in the five original mussel plots and 36% across all the mussel plots. *Phragmatopoma* averaged 28% across all nine *Mytilus* plots.

*Phragmatopoma californica* was abundant around the site and large mounds were common particularly around plot 514.

Dan searched for abalone for 30-minutes finding seven individuals ranging 65-145 mm in size. Two abalone were 11-50 cm apart; all others were 1-5 m or further apart. Andrew and Josh counted sea stars for 30-minutes finding 350 *Pisaster ochraceus* throughout the site and measuring approximately 100 individuals. Sizes ranged 30-130 mm with a mode equal to 70 mm. Dan counted 59 *P. ochraceus* in the 10x2 m transect located on the outer reef.

**4/17/12.** Departed island via CIA.

Table 12. *Haliotis cracherodii* (black abalone) counts at Santa Rosa Island, spring 2012.

| Abalone Stats Sites |              |               |        |         |             |           |       |
|---------------------|--------------|---------------|--------|---------|-------------|-----------|-------|
| Site                | Count Random | Count Density | Area   | Density | Count Sized | Mean Size | StDev |
| East Point          | 23           | 0             | 54.000 | .000    | 23          | 122.43    | 20.17 |
| Fossil Reef         | 18           | 0             | 26.900 | .000    | 18          | 117.78    | 20.45 |
| Johnson's Lee       | 7            | 0             | 8.800  | .000    | 7           | 100.71    | 35.64 |

| Site          | MinSize | MaxSize | %<45mm | %45-126mm | %127-145mm | %>145mm |
|---------------|---------|---------|--------|-----------|------------|---------|
| East Point    | 60      | 160     | -      | 43.48%    | 47.83%     | 8.70%   |
| Fossil Reef   | 70      | 150     | -      | 55.56%    | 38.89%     | 5.56%   |
| Johnson's Lee | 65      | 145     | -      | 71.43%    | 28.57%     | -       |

Table 13. Photoplot summary – mean percent cover by zone at Santa Rosa Island, spring 2012 (5 plots/zone, except the mussel zone at Johnson's Lee = 9 plots).

| PhotoZoneAvgCover |               |           |          |            |            |               |          |         |           |               |            |             |     |       |
|-------------------|---------------|-----------|----------|------------|------------|---------------|----------|---------|-----------|---------------|------------|-------------|-----|-------|
| Site              | ZoneName      | Bare Rock | Barnacle | Tetraclita | Endocladia | Hesperophycus | Silvetia | Mussels | Turf-weed | Leaf Barnacle | Misc Algae | Misc Animal | Tar | Other |
| East Point        | Barnacle      | 30.4      | 49.2     | 0.0        | 14.0       | 5.2           | 0.6      | 0.0     | 0.0       | 0.0           | 0.2        | 0.4         | 0.0 | 0.0   |
| East Point        | Endocladia    | 30.2      | 15.4     | 0.0        | 48.0       | 3.8           | 0.4      | 0.0     | 0.0       | 0.0           | 2.2        | 0.0         | 0.0 | 0.0   |
| East Point        | Silvetia      | 64.0      | 5.0      | 0.0        | 8.2        | 0.6           | 7.0      | 0.4     | 0.0       | 0.0           | 14.4       | 0.4         | 0.0 | 0.0   |
| East Point        | Mussels       | 6.6       | 0.8      | 0.0        | 0.0        | 0.0           | 0.0      | 32.8    | 7.0       | 0.0           | 6.8        | 46.0        | 0.0 | 0.0   |
| East Point        | Hesperophycus | 20.2      | 8.8      | 0.0        | 46.4       | 14.8          | 3.4      | 0.0     | 0.0       | 0.0           | 6.4        | 0.0         | 0.0 | 0.0   |
| Fossil Reef       | Barnacle      | 59.6      | 34.6     | 0.0        | 3.8        | 0.0           | 0.0      | 0.0     | 0.0       | 0.0           | 0.2        | 0.6         | 1.2 | 0.0   |
| Fossil Reef       | Endocladia    | 21.6      | 2.6      | 0.0        | 50.6       | 0.0           | 24.2     | 0.0     | 0.0       | 0.0           | 1.0        | 0.0         | 0.0 | 0.0   |
| Fossil Reef       | Silvetia      | 13.0      | 0.0      | 0.0        | 2.4        | 0.0           | 81.2     | 0.0     | 0.0       | 0.0           | 3.0        | 0.4         | 0.0 | 0.0   |
| Fossil Reef       | Mussels       | 22.8      | 0.0      | 4.0        | 0.2        | 0.0           | 0.0      | 0.4     | 10.6      | 0.8           | 47.4       | 13.8        | 0.0 | 0.0   |
| Johnson's Lee     | Barnacle      | 40.4      | 47.8     | 0.6        | 7.6        | 0.0           | 0.0      | 2.8     | 0.2       | 0.0           | 0.0        | 0.6         | 0.0 | 0.0   |
| Johnson's Lee     | Endocladia    | 59.8      | 2.6      | 1.0        | 21.0       | 0.0           | 0.0      | 14.4    | 0.0       | 0.6           | 0.0        | 0.6         | 0.0 | 0.0   |
| Johnson's Lee     | Mussels       | 19.0      | 0.0      | 0.1        | 0.0        | 0.0           | 0.0      | 36.0    | 6.4       | 1.8           | 3.9        | 32.8        | 0.0 | 0.0   |
| Johnson's Lee     | Splashzone    | 100.0     | 0.0      | 0.0        | 0.0        | 0.0           | 0.0      | 0.0     | 0.0       | 0.0           | 0.0        | 0.0         | 0.0 | 0.0   |

## **Anacapa Island April 22-25, 2012**

(Database event #2012-C)

Prepared by Stephen Whitaker

**PERSONNEL:** Dan Richards, Marine Biologist, Channel Islands National Park  
Stephen Whitaker, Bio-tech, CINP  
Andrew Domingos, Bio-tech, CINP

### **Procedure and General Notes:**

Island Packers provided transportation to East Anacapa on Sunday, April 22<sup>nd</sup>. Kayaks were used to travel from East Anacapa to Harbor Seal Arch, Middle Anacapa and South Frenchy's Cove daily. Cat Rock was not sampled during this tour. Standard procedures were followed for photographing and field scoring fixed plots. Black abalone, *Haliotis cracherodii*, and seastars were counted in 30-minute searches at Anacapa Middle West. Black abalone presence was also assessed at Harbor Seal Arch. Owl limpets, *Lottia gigantea*, were measured in fixed one-meter radius plots at Anacapa Middle West. The highest number of shorebirds and pinnipeds seen was recorded at both Anacapa Middle West and South Frenchy's Cove. A significant amount of time was spent marking plot corners with stainless steel bolts at Anacapa Middle West and South Frenchy's Cove. The Park provided transportation back to Ventura on Wednesday, April 25<sup>th</sup>.

### **Results (Daily and Site Description)**

April 22, 2012. **Low tide -0.3 ft at 0512 hrs.**

Arrival to the island occurred in the afternoon following low tide which took place before dawn. Time was spent preparing kayaks and sampling gear for the next morning and assisting Sarah Chaney with the native plant reestablishment project near housing.

**April 23, 2012. Anacapa Middle West and South Frenchy's Cove, Anacapa Island.** Low tide -0.2 ft at 0547 hrs. Conditions were excellent for sampling and travel via kayaks. Swell/surge and wind were practically nonexistent all day long and sky was overcast with light mist occurring during the early morning hours. Water temperature was not measured. More than 30 gulls, 4 black oystercatchers, 2 wandering tattlers and 3 harbor seals were seen at the site upon arrival.

Departure from the pier at Landing Cove occurred at approximately 0600. Three kayaks were used to travel to Harbor Seal Arch taking about 35 minutes. A search was conducted for black abalone presence around the reef for approximately 40 minutes. Forty-three abalone ranging 35-115 mm in size were seen. The majority of individuals were located within 1-10 cm from each other.

Anacapa Middle West was accessed at approximately 0730. Dan scored most plots (n=13) before the higher tide washed over the lower reaches of the site. Stephen and Andrew photographed plots and placed bolts in the upper corners and lower left corner of nine plots. Only one plot at this site already had bolts present to mark the corners. Most plots would benefit greatly from bolts to make them more visible since the existing epoxy markers were difficult to see and nearly all plots were marked with corners in a square orientation rather than the rectangular shape of the quadrat used to sample

photoplots. Additionally, many of the plots at this site overlap each other adding to the difficulty of locating their positions.

We departed the site at 1200. Despite the high tide, it was decided that the plots located on the inner reef at South Frenchy's Cove could be photographed and scored since the high tide was only 3.1' and conditions were mild. Kayaking over to Frenchy's Cove took 15-20 minutes. Dan scored all but the mussel plots and the two plots located on the middle reef. Stephen and Andrew photographed the plots and Stephen filled out the field log. Three black oystercatchers were seen on the reef upon arrival. No other birds or marine mammals were present.

Several sea caves were explored while traveling back to East Anacapa. Conditions were highly conducive to kayaking. Water clarity was estimated to be more than 40'. We arrived at housing at East Anacapa at approximately 1700.

**April 24, 2012, Anacapa Middle West and East, Anacapa Island.** Low tide 0.0 ft at 0626 hrs. Weather conditions remained excellent for sampling and kayaking despite a stiff breeze from the southeast during the morning hours. The sky was mostly cloudy all day with some periods of clear sky. Numerous gulls and three black oystercatchers were seen at the site upon arrival. We were on site from 0715-1030.

Dan scored the remaining plots from the previous day. Andrew counted and measured sea stars throughout the site. During a 30-minute count, 99 *Pisaster ochraceus* were found ranging 50-150 mm. Most individuals (n=27) measured 90 mm. Dan photographed the plots at Middle East and counted and measured 11 black abalone during a 30-minute count throughout Middle West. Sizes of individuals ranged 50-125 mm; most were located within 1-10 cm of another. Dan also sampled the limpet plots finding n=21, n=1 and n=12 *Lottia gigantea* in plots 1-3, respectively. Sizes of limpets across all three plots ranged 21-66 mm. Stephen continued placing bolts in the corners of plots. Upon completion, all plots at Middle West had bolts placed in both upper and the lower left corners.

Barnacle cover within the *Balanus/Chthamalus* zone averaged 14.4% and mean *Endocladia* cover was 10.4%. *Ulva* cover within the barnacle plots was 22.2%. *Endocladia* plots had 26.2% *Endocladia* and a relatively diverse assemblage of other taxa that each occurred in low abundances. Two *Endocladia* plots had 30-57% *Mytilus* cover.

In the *Silvetia* plots, *Mazzaella* was the most common (13.8%) space occupier followed by *Tetraclita* (10.6%), *Endocladia* (9.0%) and *Mastocarpus* (6.6%). No rockweed was present within the *Silvetia* plots. *Mytilus* plots had 38.4% mean mussel cover, 16.6% articulated corallines, 15.2% *Mazzaella*, 8.6% *Tetraclita*, and 7% *Gelidium/Pterocladia* cover.

The plots at Anacapa Middle East were scored in the office by Stephen. *Balanus/Chthamalus* were absent within the barnacle plots; biotic cover consisted primarily of *Tetraclita* (mean=17%), *Ulva* (mean=13.6%) and *Endocladia* (mean=7.7%). *Endocladia* plots had 16% *Endocladia*, 23.7% *Ulva* and approximately 7% each of *Tetraclita* and *Porphyra*. The rockweed plots were devoid of *Silvetia* but had 41% *Ulva*, 11.3% *Mazzaella* and 9.3% *Porphyra* among other less common species. *Mytilus* plots had 61% mussels though plot 477 was mostly dominated by a complex of red algae.

Dan paddled over to Frenchy's Cove to attempt to score the plots he was unable to score the previous day, but the south swell had increased enough to make scoring difficult. He scored the two plots on the middle reef but was unable to access the offshore reef where the five mussel plots are located.

**April 25, 2012, South Frenchy's Cove, Anacapa Island.** Low tide 0.1 ft at 0710 hrs. Ocean conditions were mild with only a slight increase in swell/surge. Wind out of the southeast blew approximately 10 knots. Dan and Stephen paddled over to Frenchy's Cove to score the mussel plots and add bolts to plots that had become difficult to locate. One western gull, 3 black oystercatchers and 1 American oystercatcher was seen at the site upon arrival at 0800.

Dan scored and photographed the five mussel plots while Stephen placed bolts in the corners of the same plots. Even though it was near low tide, the outer plots were frequently getting washed over by waves. Dan assisted with the plot repairs once he completed scoring.

Barnacle cover within the *Balanus/Chthamalus* zone averaged 12.6% and mean *Endocladia* cover was 37.4%. *Endocladia* plots had 78.6% *Endocladia* and some *Silvetia* (mean=7.6%) among other less common species. *Silvetia* plots had 47.2% *Silvetia*. *Mytilus* plots had 84.6% mean mussel cover and low abundances of other species.

The Park boat was utilized to travel back to Ventura.

Table 14. *Haliotis cracherodii* (black abalone) counts at Harbor Seal Arch and Middle West, Anacapa Island, spring 2012.

| Site             | Count Random | Count Density | Area  | Density | Count Sized | Mean Size | StDev |
|------------------|--------------|---------------|-------|---------|-------------|-----------|-------|
| Harbor Seal Arch | 44           | 0             | 7.500 | .000    | 44          | 72.36     | 22.21 |
| Middle West      | 11           | 0             | 7.500 | .000    | 11          | 66.36     | 24.81 |

Table 15. *Haliotis cracherodii* (black abalone) counts at Harbor Seal Arch and Middle West, Anacapa Island, spring 2012.

| Site             | Min Size | Max Size | %<45mm | %45-126mm |
|------------------|----------|----------|--------|-----------|
| Harbor Seal Arch | 35       | 115      | 13.64% | 86.36%    |
| Middle West      | 25       | 125      | 9.09%  | 90.91%    |

Table 16. *Lottia gigantea* counts in plots at Middle West, Anacapa Island, spring 2012.

| Plot | Count Density | Area | Density | Count Sized | Mean Size | StDev | Min Size | Max Size |
|------|---------------|------|---------|-------------|-----------|-------|----------|----------|
| 1    | 21            | 3.14 | 6.688   | 21          | 46.00     | 11.10 | 21       | 65       |
| 2    | 1             | 3.14 | .318    | 1           | 32.00     |       | 32       | 32       |
| 3    | 12            | 3.14 | 3.822   | 12          | 48.67     | 10.08 | 32       | 66       |

Table 17. *Lottia gigantea* size frequencies in plots at Middle West, Anacapa Island, spring 2012.

| Plot | %<20mm | %20-29mm | %30-39mm | %40-49mm | %50-59mm | %60-69mm | %70-79mm |
|------|--------|----------|----------|----------|----------|----------|----------|
| 1    | 0.00%  | 4.76%    | 19.05%   | 28.57%   | 42.86%   | 4.76%    | 0.00%    |
| 2    | 0.00%  | 0.00%    | 100.00%  | 0.00%    | 0.00%    | 0.00%    | 0.00%    |
| 3    | 0.00%  | 0.00%    | 8.33%    | 50.00%   | 25.00%   | 16.67%   | 0.00%    |

Table 18. Photoplot summary – mean percent cover by zone at Anacapa Island, spring 2012 (5plots/zone at Middle West and South Frenchy's Cove, 3 plots/zone at ME).

| Site                       | ZoneName       | Bare Rock | Barnacle | Tetraclit<br>a | Endocladi<br>a | Hespero-<br>phycus | Silveti<br>a | Mussel<br>s | Turf-<br>weed | Leaf<br>Barnacle | Misc<br>Algae | Misc<br>Animal |
|----------------------------|----------------|-----------|----------|----------------|----------------|--------------------|--------------|-------------|---------------|------------------|---------------|----------------|
| Middle East                | Barnacle       | 54.0      | 0.0      | 17.0           | 7.7            | 0.0                | 0.0          | 0.3         | 0.0           | 0.0              | 20.0          | 1.0            |
| Middle East                | Endocladi<br>a | 36.3      | 0.3      | 7.0            | 16.0           | 0.0                | 0.0          | 0.0         | 1.0           | 0.0              | 39.3          | 0.0            |
| Middle East                | Silvetia       | 20.3      | 0.0      | 2.7            | 1.0            | 0.0                | 0.0          | 0.0         | 1.0           | 0.0              | 75.0          | 0.0            |
| Middle East                | Mussels        | 1.3       | 0.0      | 3.7            | 0.0            | 0.0                | 0.0          | 61.0        | 14.7          | 0.0              | 18.3          | 1.0            |
| Middle West                | Barnacle       | 38.2      | 14.4     | 1.4            | 10.4           | 0.0                | 0.0          | 6.4         | 0.6           | 0.0              | 27.0          | 1.6            |
| Middle West                | Endocladi<br>a | 36.2      | 3.4      | 2.6            | 26.2           | 0.0                | 0.0          | 17.4        | 0.4           | 0.0              | 12.8          | 1.0            |
| Middle West                | Silvetia       | 43.4      | 0.0      | 10.6           | 9.0            | 0.0                | 0.0          | 0.4         | 4.8           | 0.2              | 29.8          | 1.8            |
| Middle West                | Mussels        | 5.4       | 0.0      | 8.6            | 1.2            | 0.0                | 0.0          | 38.4        | 10.2          | 0.0              | 35.2          | 1.0            |
| South<br>Frenchy's<br>Cove | Barnacle       | 36.0      | 12.6     | 0.0            | 37.2           | 0.0                | 0.2          | 0.0         | 0.2           | 0.0              | 12.2          | 1.2            |
| South<br>Frenchy's<br>Cove | Endocladi<br>a | 10.0      | 0.0      | 0.0            | 78.4           | 1.4                | 7.8          | 0.0         | 0.0           | 0.0              | 2.4           | 0.0            |
| South<br>Frenchy's<br>Cove | Silvetia       | 24.0      | 1.0      | 0.0            | 5.4            | 0.0                | 47.2         | 0.0         | 0.2           | 0.0              | 22.0          | 0.2            |
| South<br>Frenchy's<br>Cove | Mussels        | 6.0       | 0.0      | 0.2            | 0.0            | 0.0                | 0.0          | 84.6        | 2.0           | 0.0              | 6.2           | 1.0            |

## Santa Cruz Island May 8-12, 2012

(Database event #2012-D)

Prepared by Stephen Whitaker

**PERSONNEL:** Dan Richards, Marine Biologist, Channel Islands National Park  
Stephen Whitaker, Bio-tech, CINP  
Andrew Domingos, Bio-tech, CINP

### ***Procedure and General Notes:***

Stephen Whitaker and Andrew Domingos took the Park boat out to Prisoners Harbor on May 8<sup>th</sup> and returned via Island Packers on May 12<sup>th</sup>. Dan Richards came out for one day (May 11<sup>th</sup>) of sampling at Willows Anchorage. 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. We stayed at the UC Natural Reserve System, field station for two nights and camped at Trailer for two nights. Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Most photoplots were scored in the field with the exception of two *Mytilus* plots at Willows Anchorage that were consistently wetted by waves. Sea stars and black abalone were counted at all sites. Surfgrass transects were sampled at Trailer and Fraser Cove. *Lottia gigantea* and motile invertebrates were not sampled at any site this tour. The maximum number of shorebirds and pinnipeds observed at each site was recorded. Hobotemp Tidbit temperature loggers were downloaded.

**9 May, Trailer**, low tide -1.0 ft at 0719. Since the low tide occurred early in the morning, we decided to sample Trailer because it requires the least amount of travel time to access the site (when camping) compared to other sites on the island. We arrived on site at 0555 and worked until 1100. Working conditions were good overall with a light marine layer moving onshore. A medium-sized swell with occasional sets to three feet impacted the site primarily around surfgrass transect-3. Wind was light. One black oystercatcher was observed on the reef at arrival. No other birds or pinnipeds were seen around the monitoring site during our visit.

Stephen and Andrew shot photos of the plots and site. Andrew recorded for Stephen as he scored the surfgrass transects. *Phyllospadix* overstory cover was 61%, 56% and 29% on transects 1-3, respectively. Other red algae were the most dominant taxa in the transects not including surfgrass. Andrew counted sea stars for 30-minutes finding 302 *Pisaster ochraceus* and 2 *Patiria miniata* throughout the site. Sizes for *P. ochraceus* ranged 40-140 mm and the mode was 90 mm. Stephen searched for black abalone and found 33 individuals throughout the site. Approximately 20 black abalone were seen during a 30-minute count. Sizes of abalone throughout the site ranged 50-160 mm. Most abalone were seen within 1-10 cm of another individual.

Stephen scored plots in the field. *Balanus* and *Chthamalus* were common in the barnacle plots (mean=29.8%). *Silvetia* was common (mean cover=56% in the *Silvetia* plots) and appeared healthy.

*Hesperophycus* was scarce (mean cover=10.5% in the *Hesperophycus* plots). *Endocladia* appeared thick and healthy (mean cover=24.6% in the barnacle plots and 14% in the *Hesperophycus* plots).

**10 May, Fraser Cove**, low tide -0.6 ft at 0819. Surf was medium-sized (4-5' NW) but conditions were not hazardous and were conducive to sampling. Surfgrass transects were accessible but waves washed over them when the largest sets came through. Wind was light and sky was cloudy all morning. Five black oystercatchers and one willet were seen at Fraser. No pinnipeds were observed at the site or swimming in the cove. At Forney's, two black oystercatchers and two willets were seen on the reef. We monitored the two sites from 0630 to 1200 hrs.

The rockweed plots at Forney's were photographed and scored first thing in the morning. Stephen and Andrew photographed the plots and panoramas. Stephen scored the plots with Andrew recording. At Fraser, Andrew counted *Pisaster* (n=240 (range=60-170mm, mode=120mm) and searched for black abalone (n=0) for 30 minutes. Stephen scored all the photo plots and surfgrass transects. However, it was later determined that T-1 was incorrectly positioned, and therefore will be omitted. Overstory cover of surfgrass was 57 and 75% in T-2 and T-3, respectively.

Barnacle cover averaged 18.2% in the barnacle plots. Mean *Endocladia* cover was 70% throughout the *Endocladia* zone. *Silvetia* comprised 19.8% of the total cover in the *Silvetia* plots and *Hesperophycus* mean cover was 36.6% in the representative zone. Mean *Endocladia* cover was 18.2% in the *Silvetia* plots and 24.2% in the *Hesperophycus* zone. The *Pollicipes* plots only had a mean cover of 14.4% for *Pollicipes*, but *Mytilus* were fairly abundant within the *Pollicipes* plots averaging 41%. *Phragmatopoma* was present in 4 out of 5 plots averaging 18%. *Mytilus* cover averaged 70.4% in the mussel plots. Tar cover in the tar plots averaged 41%.

**11 May, Willows Anchorage**, low tide -0.3 at 0923 hrs. Medium-sized swell/surge and light wind made for descent sampling conditions throughout the majority of the site with the exception of the area around the mussel plots that was frequently wetted by waves. Four black oyster catchers (two individuals were observed at the island within the cove) and two black phoebes were seen within the vicinity of the site. No marine mammals were observed at or nearby the site. Dan, Stephen and Andrew monitored the site from 0745 to 1115 hrs.

Stephen and Andrew shot photos of the plots and site. Stephen scored the plots. Dan counted and measured 346 black abalone in 140 minutes. A total of 11 tagged abalone were found. One fresh black abalone shell with a tag was also found. Site was only sampled to crevice #17 due to incoming tide and moderate-sized swell. Black abalone were observed in other parts of the site however. Andrew counted 719 *P. ochraceus* in 30 minutes and measured 108 individuals (sizes ranged 40-180mm, modes=90mm and 110mm). The temperature logger was downloaded during this visit at 0800.

Mean *Endocladia* cover in the *Endocladia* plots was 63.2%. *Silvetia* and *Hesperophycus* were absent from all but one plot in each of their representative zones. *Endocladia* (mean=46%) occupied most of the space in the *Hesperophycus* plots. The *Silvetia* plots had relatively high cover of *Endocladia* (mean=29%) and *Mazzaella* (mean=8.2%) compared with other space-occupying species. Mean

cover for *Mytilus* in the mussel plots was 60.2%. Articulated corallines occupied 6% of the mussel pots.

**12 May, Prisoners Harbor**, low tide 0.1 ft at 1028 hrs. Air temperature was 16.5° C. Overcast sky, light wind, and virtually no swell in the harbor made for perfect sampling conditions. No birds or pinnipeds were seen on or nearby the site with the exception of two ravens perched on bluff above site. We sampled the site from 0815-1200 hrs.

Andrew and Stephen photographed the plots and site. Stephen scored all plots. Andrew counted 57 *P. ochraceus* (range=80-170mm) during a 20-minute search of the entire site. One black abalone (98mm) was found in its normal location near plot 831.

The barnacle plots had 26.4% mean *Balanus/Chthamalus* cover. *Ulva* was moderately abundant (mean=20.2%) in the barnacle zone. The *Endocladia* plots had 51% mean *Endocladia* cover. Barnacles (mean=22.2%) were also common in the five plots. Only one *Mytilus* plot had mussels present (3%). *Phragmatopoma* (mean=25.6%), Articulated corallines (mean=10.6%), *Chondracanthus* (mean=26%) and *Mazzaella affinis* (mean=18.8%) were the most abundant assemblages and species in the mussel zone.

*Silvetia* zone only had *Silvetia* in three plots (mean=6.8%). *Endocladia* (mean=13%) and *Chthamalus/Balanus* (mean=26.4%) were moderately abundant. *Hesperophycus* plots only had 4.6% mean *Hesperophycus* cover. Mean barnacle and *Endocladia* cover was 30% and 25%, respectively.

Table 19. Photoplot summary – mean percent cover by zone at Santa Cruz Island, spring 2012 (5 plots/zone, except 6 plots/zone in *Hesperophycus* zone at Trailer).

| Site              | ZoneName      | Bare Rock | Barnacle | Tetraclita | Endocladia | Hesperophycus | Silvetia | Mussels | Turfweed | Leaf Barnacle | Misc Algae | Misc Animal | Tar  | Other |
|-------------------|---------------|-----------|----------|------------|------------|---------------|----------|---------|----------|---------------|------------|-------------|------|-------|
| Fraser Cove       | Barnacle      | 48.4      | 18.2     | 0.0        | 15.0       | 0.0           | 0.0      | 3.6     | 0.0      | 0.0           | 11.0       | 0.8         | 1.2  | 0.0   |
| Fraser Cove       | Endocladia    | 14.4      | 2.0      | 0.0        | 70.0       | 0.0           | 0.0      | 5.8     | 0.0      | 0.0           | 7.0        | 0.6         | 0.0  | 0.0   |
| Fraser Cove       | Rockweed      | 35.0      | 2.8      | 0.0        | 18.2       | 9.4           | 19.8     | 0.0     | 1.2      | 0.0           | 10.8       | 1.6         | 0.0  | 1.0   |
| Fraser Cove       | Mussels       | 4.6       | 0.0      | 0.0        | 0.0        | 0.0           | 0.0      | 70.4    | 0.0      | 2.2           | 5.6        | 17.2        | 0.0  | 0.0   |
| Fraser Cove       | Pollicipes    | 12.2      | 0.0      | 1.4        | 5.0        | 0.0           | 0.0      | 41.0    | 0.0      | 14.4          | 8.0        | 18.0        | 0.0  | 0.0   |
| Fraser Cove       | Tar           | 29.2      | 29.0     | 0.0        | 0.8        | 0.0           | 0.0      | 0.0     | 0.0      | 0.0           | 0.0        | 0.0         | 41.0 | 0.0   |
| Fraser Cove       | Hesperophycus | 30.0      | 2.4      | 0.0        | 24.2       | 36.6          | 0.8      | 0.0     | 0.8      | 0.0           | 4.8        | 0.0         | 0.0  | 0.0   |
| Prisoner's Harbor | Barnacle      | 10.2      | 26.4     | 0.2        | 18.0       | 4.0           | 0.0      | 3.6     | 3.6      | 0.0           | 33.6       | 0.4         | 0.0  | 0.0   |
| Prisoner's Harbor | Endocladia    | 17.0      | 22.2     | 0.0        | 51.0       | 2.4           | 0.0      | 1.4     | 0.8      | 0.0           | 4.2        | 0.8         | 0.0  | 0.0   |
| Prisoner's Harbor | Rockweed      | 7.4       | 38.4     | 1.4        | 13.0       | 2.4           | 6.8      | 4.2     | 0.4      | 0.0           | 24.2       | 1.6         | 0.0  | 0.0   |
| Prisoner's Harbor | Mussels       | 2.0       | 1.0      | 9.2        | 0.0        | 0.0           | 0.0      | 0.6     | 29.0     | 0.0           | 32.0       | 26.4        | 0.0  | 0.0   |
| Prisoner's Harbor | Hesperophycus | 14.2      | 30.0     | 0.0        | 25.0       | 4.6           | 0.0      | 0.0     | 0.0      | 0.0           | 25.8       | 0.4         | 0.0  | 0.0   |
| Trailer           | Barnacle      | 30.2      | 29.8     | 1.2        | 24.6       | 0.0           | 0.0      | 0.8     | 0.0      | 0.0           | 11.4       | 2.0         | 0.0  | 0.0   |
| Trailer           | Rockweed      | 18.2      | 7.4      | 0.0        | 6.8        | 0.8           | 56.0     | 0.0     | 1.4      | 0.0           | 5.8        | 3.6         | 0.0  | 0.0   |
| Trailer           | Mussels       | 2.6       | 0.0      | 0.2        | 0.0        | 0.0           | 0.0      | 53.8    | 3.0      | 0.0           | 11.2       | 29.2        | 0.0  | 0.0   |
| Trailer           | Hesperophycus | 26.2      | 11.7     | 0.0        | 14.0       | 10.5          | 36.3     | 0.0     | 0.0      | 0.0           | 1.3        | 0.0         | 0.0  | 0.0   |
| Willows Anchorage | Endocladia    | 29.2      | 0.0      | 3.6        | 63.2       | 0.0           | 0.0      | 0.6     | 0.0      | 1.0           | 1.6        | 0.6         | 0.0  | 0.0   |
| Willows Anchorage | Rockweed      | 25.4      | 5.6      | 0.0        | 29.2       | 0.0           | 2.0      | 0.0     | 0.0      | 0.0           | 34.2       | 3.6         | 0.0  | 0.0   |
| Willows Anchorage | Mussels       | 14.4      | 0.0      | 3.4        | 0.0        | 0.0           | 0.0      | 60.2    | 2.4      | 3.0           | 12.2       | 4.4         | 0.0  | 0.0   |
| Willows Anchorage | Hesperophycus | 23.8      | 3.4      | 0.0        | 46.0       | 2.0           | 0.0      | 0.0     | 0.0      | 0.0           | 24.0       | 0.4         | 0.0  | 0.0   |

Table 20. *Haliotis cracherodii* (black abalone) counts at Santa Cruz Island, spring 2012.

| Site Code  | Count<br>Random | Count<br>Density | Area | Density | Count<br>Sized | Mean<br>Size | StDev | MinSize | MaxSize | %<45mm | %45-126mm | %127-145mm | %>145mm |
|------------|-----------------|------------------|------|---------|----------------|--------------|-------|---------|---------|--------|-----------|------------|---------|
| Fraser     | 0               | 0                |      | .000    | 0              |              |       |         |         | -      | -         | -          | -       |
| Prisoner's | 1               | 0                |      | .000    | 1              | 98.00        |       | 98      | 98      | -      | 100.00%   | -          | -       |
| Trailer    | 33              | 0                |      | .000    | 33             | 105.70       | 28.06 | 50      | 160     | -      | 78.79%    | 12.12%     | 9.09%   |
| Willows    | 347             | 0                |      | .000    | 347            | 72.20        | 17.94 | 20      | 180     | 2.88%  | 96.54%    | -          | 0.58%   |

## **Santa Rosa Island, May 22-28, 2012**

(Database event #2012-E)

Prepared by Dan Richards

**PURPOSE:** To monitor snowy plovers and rocky intertidal sites at Santa Rosa Island.

**PERSONNEL:** Dan Richards, Marine Biologist, Channel Islands National Park  
Laurie and Jeff Jergens, visiting researchers from UC Davis (not participating in monitoring)

**PROCEDURE and general observations:** Because of the high winds predicted this week, the boat was cancelled and we flew to Santa Rosa Island. Laura and Jeff Jergens were with me to install temperature loggers (*ibuttons*) under mussel and *Neorhodomela* beds as part of her dissertation work at UC Davis. The primary mission was to count snowy plovers during the breeding season survey window. Standard procedures for counting plovers and other shorebirds were followed on beaches. Low tides were utilized to photograph plots at Ford Point and Northwest-Talcott rocky intertidal sites that we were unable to complete in April. Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Photoplots were not scored in the field. The maximum number of shorebirds and pinnipeds observed at each site was recorded.

**5/23/12. Ford Point.** Low tide -0.4 ft. at 0621. It was very windy all night and today but there was essentially no swell. I dropped off Laura and Jeff to work at the Bechers reef to install the loggers then proceeded to Ford Pt. I was on site from 0650-0930. Five black oystercatchers were in the area (four on the reef and one to the west). Only one western gull was around. At least five elephant seals were playing in the surfgrass in front of the site. There were a few dozen on the Ford Point beach

Dan counted black abalone from 0705-0800 finding 41 total. No measurements were made but one was estimated to be about 50 mm and 8 were estimated to be about 70-80 mm. five were estimated to be over 140 mm. The rest appeared to be about 100-130 mm. One was in plot 1 in the usual spot among the *Phragmatopoma* that it has been in for the last several visits. Dan counted seastars from 0800-0830 as the tide was starting to rise so not all the low areas were included. I counted 246 *Pisaster ochraceus*. No other species were found. *Lottia* plots and photoplots were photographed as well as pans from OT1 and OT4. The plot repairs made this winter looked good but the *Lottia* plot bolts still need to be replaced. Algae were lush and healthy. Numerous small plants of *Desmarestia ligulata* were seen in the tidepools. A few *Scytosiphon lomentaria* and *Cumagloia* were found. There was a little bit of *Porphyra perforata*. *Callithamnion pikeanum* was common.

Stephen scored all the photoplots in the office. Barnacle cover averaged 27.4% in the barnacle plots. *Endocladia* cover in barnacle plot 523 was 73%. *Endocladia* cover averaged 46% in its representative zone. Mussel cover averaged 6.6% and barnacle cover averaged 5.8% across all the *Endocladia* plots. Overall, the *Endocladia* plots were quite diverse. Mussel cover averaged 35.8% in the *Mytilus* zone. Mussels were absent from plots 532 and 534. Instead, *Phragmatopoma* and *Ulva* were most dominant.

**5/24/12. Northwest-Talcott.** Low tide -0.2 ft. at 0701 hrs. High wind and moderate swell. There were 20-30 elephant seals on the access beach but no seals at the site or west of where we climbed down the bluff. There were four black oystercatchers and 35 western gulls on the reef. Both water and air temperatures were 11.8°C. We were on site from 0600-0930. Laura and Jeff installed their ibutton array under *Neorhodomela* about 50 m east of plot 565 and under mussels a few hundred meters west of our site by the first transplant reef (from Joan Rudiger's experiment).

I shot all the photos of plots, *Lottia* plots, pans and surfgrass transects. I did not use the shade because it was so windy and I was working alone. I scored the surfgrass transects SG1= 94 *Phyllospadix*, 5 rock and 1 coralline crust, SG2= 96 *Phyllospadix* and 4 rock, SG3= 44 *Phyllospadix*, 17 *Sargassum muticum*, 41 green algae (*Ulva*), 1 erect coralline algae, 7 red algae and 5 *Phyllospadix* understory.

Dan found rockweed gunnels and juvenile monkeyface eels. Several *Hemigrapsus nudus* were found, these are unusual here and on the island in general but not unheard of under the cobble stones. *Ulva* was quite abundant throughout the site. *Sargassum muticum* was abundant and there was some *Scytosiphon lomentaria*. Ectocarpoid fuzz was common. *Smithora niadum* was common.

Stephen scored the photoplots in the office. Barnacle cover averaged 15.8% in the barnacle plots. *Silvetia* was present in moderate amounts (5-76%) in four of the plots. *Endocladia* plots had 18% *Endocladia*. *Silvetia* plots had 52.2% *Silvetia*. *Mytilus* plots had 21.2% mussels and were relatively speciose. *Ulva* (15.2%), *Porphyra* (13.8%) and *Gelidium* (9%) were the most common space-occupiers.

Dan checked the cove to the east and saw one large nest and four great blue herons were seen flying out of the cove. Two peregrine falcons were hovering over me the whole time I was on that part of the cove. There are cormorant nests at the top of the bluff that I am sure are double-crested cormorants and not Brandt's. This would be the first documented nesting of DCCO on Santa Rosa Island apparently. *Castellja mollis* was common. There were numerous dried stems of *Orobancha* on the bluffs

In the evening I went over to La Jolla Vieja to look for plovers. There were about 60 elephant seals and one harbor seal. There were three killdeer chicks foraging around the elephant seals on the upper beach and road. I did not see the adults. One black oystercatcher flew by. At Officers Beach there were over 100 elephant seals and one harbor seal. There were at least three seal carcasses on the beach. No birds were present.

**5/25/12** it was very windy all day but the Island Packers boat did make it out about noon. Laura and Jeff went in. After dropping them off I worked on the computer –out of the wind, since I couldn't do counts anywhere.

**5/26/12 Skunk Point.** Low tide was 0.2 ft. at 0828. There was a little break in the wind this morning with averages near 20 mph. I went out to Skunk Point to count snowy plovers. I started at Southeast Anchorage at 0700. There were 8 black oystercatchers on the beach and rocks, a few western gulls and two ravens. On Skunk Point beach there were 16 common ravens and 16 western gulls. Both

were scavenging but the only carcasses I found were an old female adult sealion and a gutted rockfish. About  $\frac{3}{4}$  of the way to the point there was a pair of snowy plovers hiding behind the wrack hummocks. Much of the beach was blown clean with little debris or wrack. Near the point and to the south were low hummocks behind surfgrass wrack.

Between Skunk Point and Oat Point I found two pairs of snowy plovers and one male with one small chick. At the point the sand was actually making a spit to the southeast, probably because of all the blowing sand. There was no surf to speak of. Two black oystercatchers were at Skunk Point. Four mallard ducks were standing around on the middle of the beach.

At Oat Point up on the rocks was a female snowy plover. She was still there when I returned as I walked back along the shore. Also at Oat Point were three black oystercatchers and a black-bellied plover along with two western gulls. The Oat Point Lagoon was full of water. There were fox and skunk tracks in the dunes.

Old Ranch Lagoon was closed to the sea. At station 1 the water was 15.3°C. It looked like the high tide waves were washing into the lagoon. There was a great blue heron on the shore and 20-30 ducks. Most were mallards but at least two northern shoveler males were in the group. It was hard to see them at a distance and it was windy but the ducks had very white bellies and neck, dark green heads that were very pointed when they flew, also had rusty colored vent area. Three brant geese were feeding on surfgrass in the intertidal in front of the lagoon. No plovers were seen there or at Old Ranch House Canyon. No other birds were seen at the large lagoon besides ducks from the Old Ranch. There were still a few *Dudleya blockmanii* and *Lasthenia* blooming at Old Ranch and the *Dudleya candelabrum* were doing very well and Old Ranch House Canyon. There were several large gaper clam shells washed up on the beach in front of the lagoon. Several large *Cancer productus* were in the wrack. I turned back at the big lagoon just after 1000 hrs.

On the walk back there were five sanderlings at Skunk Point. Total snowy plovers for the day was eight adults and one chick.

**5/27/12 Cluster Point.** Low tide 0.4 ft at 0918. I started at Bee Rock Beach west at 0815. The wind was still averaging 17 mph and it was clear. There were 27 common raven on the beach. As I saw yesterday they were digging small pits in the sand and appeared to be eating small sand crabs or beach hoppers. Yesterday the pits were full of small sand crabs 10-20mm, today I couldn't find anything in the sand and they were higher on the beach where I would not expect to find many *Emerita*. The only carcasses I found were a young elephant seal and a pelagic cormorant. There was very little debris on west beach, just a couple of trawl floats and a large flower pot. There were a few plastic bottles on middle and east beaches, that was all. Fresh tar blobs were common and some were 30 cm in diameter. Western gulls were present (about 10). Five more ravens were on the other beaches. There was a pair and a single black oystercatcher. About 200 elephant seals were present between the three beaches. The rocks at middle Bee Rock had a high density of large *Lottia gigantea*. Seals were packed into the opening at no-name canyon so I had to turn back.

I was at Mud Tank at 1130. No plovers. There were two western gulls and two common ravens. About 80 elephant seals and two harbor seals were on the beach.

Between 1300 and 1500 I walked the beaches from China Camp. There were several hundred elephant seals on China and Cluster Point. I did not see any shorebirds on the beach. At the end of Whetstone Canyon there were 10 whimbrels and 3 black oystercatchers. There were 2 ravens at China Camp, 2 at Whetstone and 2 at no name canyon.

**5/28/12 Soledad/Arlington Canyon.** Low tide 0.6 ft. 1011. With the low tide I was able to walk to Tecalote Canyon and beyond. The wind was nearly calm. The sky was clear and it was very pleasant for a change. I checked Dry Canyon Beach from the bluff at 0725. There were 18 mallard ducks on the lagoon there. Lots of *Macrocystis* wrack was washed up on all the beaches today. There was a dead female adult sea lion at Soledad Canyon. Large tar blobs were present among the wrack. There was very little plastic debris- just a few trap floats a couple of plastic bottles, a straw a plastic cup and an urchin net. Six gulls were present, 3 were light color all over with pink legs and a black spot on the bill tip. One was a herring gull the other two were western gulls. One raven was present.

On Soledad West there were many trap floats, several lobster traps, and the usual small number of plastic bottles and other containers and a few balloons. At the west end of the beach there was a pair of black oystercatchers. On my return walk they had been joined by a hybrid black/American oystercatcher. Several cormorants were on a rocky point.

At Arlington Canyon an immature bald eagle with blue wing tags and radio transmitter flew over. There were two common ravens and on the return walk a young red-tailed hawk was perched on the bluff. Kelp wrack was piled high. The large ship mooring can is still on the beach in about the same spot it was in the early 1990's. Several lobster traps were on the beach along with a dozen or two trap floats.

There were nearly 60 mallards in the surfgrass flats of the intertidal zone between Arlington and Tecalote Canyons. Some of those were probably the same ones I saw at Dry Canyon. There was a great egret west of Tecalote,

I saw a covey of quail in Lobos Canyon that had a bunch of chicks about the size of my thumb.

Table 21. Photoplot summary – mean percent cover by zone at Santa Rosa Island, spring 2012 (5 plots/zone).

| Site              | Zone Name  | Bare Rock | Barnacle | Tetraclita | Endocladia | Hesperophycus | Silvetia | Mussels | Turf weed | Leaf Barnacle | Misc Algae | Misc Animal | Tar | Other |
|-------------------|------------|-----------|----------|------------|------------|---------------|----------|---------|-----------|---------------|------------|-------------|-----|-------|
| Ford Point        | Barnacle   | 48.6      | 27.4     | 0.0        | 20.0       | 0.0           | 0.0      | 1.4     | 0.0       | 0.0           | 0.4        | 2.2         | 0.0 | 0.0   |
| Ford Point        | Endocladia | 26.2      | 1.6      | 0.0        | 46.0       | 0.0           | 0.0      | 6.6     | 0.2       | 0.0           | 17.8       | 1.6         | 0.0 | 0.0   |
| Ford Point        | Mussels    | 14.8      | 2.8      | 0.0        | 0.8        | 0.0           | 0.0      | 35.8    | 7.2       | 0.0           | 27.8       | 10.8        | 0.0 | 0.0   |
| Ford Point        | Splashzone | 100.0     | 0.0      | 0.0        | 0.0        | 0.0           | 0.0      | 0.0     | 0.0       | 0.0           | 0.0        | 0.0         | 0.0 | 0.0   |
| Northwest Talcott | Barnacle   | 44.0      | 15.8     | 0.0        | 2.0        | 0.0           | 28.4     | 0.0     | 0.0       | 0.0           | 9.6        | 0.0         | 0.2 | 0.0   |
| Northwest Talcott | Endocladia | 49.6      | 4.2      | 0.0        | 18.0       | 0.0           | 2.0      | 0.0     | 0.6       | 0.0           | 23.8       | 1.8         | 0.0 | 0.0   |
| Northwest Talcott | Rockweed   | 37.6      | 0.0      | 0.0        | 6.2        | 0.0           | 52.2     | 0.0     | 0.0       | 0.0           | 4.0        | 0.0         | 0.0 | 0.0   |
| Northwest Talcott | Mussels    | 22.6      | 0.2      | 0.4        | 0.0        | 0.0           | 0.0      | 21.2    | 9.8       | 5.2           | 38.8       | 1.8         | 0.0 | 0.0   |

Table 22. *Haliotis cracherodii* (black abalone) counts at Santa Rosa Island, spring 2012.

| Site Code | Count Random | Count Density | Area   | Density | Count Sized | Mean Size | StDev | Min Size | Max Size | %<45 mm | %45-126mm | %127-145mm | %>145mm |
|-----------|--------------|---------------|--------|---------|-------------|-----------|-------|----------|----------|---------|-----------|------------|---------|
| FR        | 18           | 0             | 26.900 | .000    | 18          | 117.78    | 20.45 | 70       | 150      | -       | 55.56%    | 38.89%     | 5.56%   |
| NWT       | 0            | 0             | 38.900 | .000    | 0           |           |       |          |          | -       | -         | -          | -       |

## Santa Cruz Island, October 28-30, 2012

(Database event #2012-F)

Prepared by Stephen Whitaker

**PERSONNEL:** Stephen Whitaker, Marine Biologist, Channel Islands National Park  
Alex Laine, VIP

**PROCEDURE and general observations:** Standard procedures were used for monitoring the rocky intertidal site, Scorpion Rock. All plots and site overviews were photographed with an Olympus1030 digital camera. Motile invertebrates were not counted due to time constraints. All photoplots were field-scored. Seastars and black abalone were counted and measured. There are no owl limpet plots established at Scorpion Rock. The maximum number of shorebirds and pinnipeds observed at the site was recorded. There is not a Hobotemp Tidbit temperature logger at Scorpion Rock. We used Island Packers transportation to travel to Scorpion Anchorage at Santa Cruz Island on Sunday 10/28 and returned to Ventura on Tuesday (10/30) via the Park boat. We stayed in Park housing for two nights and used the Seabird program kayaks to access our monitoring sites at Scorpion Rock. Summary tables of the data are presented at the end.

**28 October, Scorpion Rock,** low tide 0.0 ft at 1454. Conditions were excellent with clear sky and unseasonably warm temperatures due to the mild Santa Ana winds that have been blowing the last several days. We used Island Packers to transport from Ventura to Scorpion Anchorage. Kayaks borrowed from David Mazurkiewicz and the seabird monitoring group were used to access the sites. We only sampled the main site (Site A) today. There were not any shorebirds on the reef upon arrival likely due to the high number of kayakers and boaters in the area. Three California sealions and three harbor seals were observed nearby the site chasing baitfish. The sealions remained in the vicinity of the site for at least one-half hour. Several boats were anchored within a quarter mile of Scorpion Rock. We were on site from 1300-1800.

At the main reef (Site A), Alex and I were joined by SCA intern Carl Schwarz. The three of us worked together to locate and photograph all the plots. Carl shot all the panoramic photos, then waited around for a few minutes to observe me scoring the plots. Alex recorded for me. After scoring all the plots, I searched for black abalone throughout the entire reef for approx. one hour finding 31 individuals ranging 20-120mm. Most abalone were located 1-10cm apart from each other. Alex spent 30 minutes searching for sea stars (N=143 *Pisaster ochraceus*) and measured 49 individuals ranging 80-130mm in size (mode=110mm).

The main reef looked similar this season compared to that of previous visits. *Mytilus* were rare and only occurred in small patches in a few places along the reef. Several (N=12) *Megathura crenulata* were seen. *Endocladia* and *Mazzaella* appeared to be abundant and healthy. *Tetraclita* were highly abundant with numerous recruits present. The lower intertidal was predominantly covered with *Corallina vancouveriensis*, *C. pinnatifolia* and *Gelidium coulteri* (much of the algae were bleached in the mid intertidal zone). *Strongylocentrotus purpuratus* were abundant in the main large tidepool and throughout the lower intertidal. *Egregia* was common.

Barnacle plots supported mediocre abundances of both *Balanus* and *Chthamalus* (mean cover=25.2%) and *Endocladia* (mean cover=37%). *Endocladia* was abundant in the representative plots (mean cover=52.8%). *Mytilus* and *Tetraclita* plots were diverse. Mean *Tetraclita* cover measured in the *Mytilus* plots was 26.6% and in the *Tetraclita* plots was 58.6% (for reference, *Tetraclita* abundance was 15% last year). Articulated corallines were common in the mussel plots (mean cover=34.2%). Mean *Mazzaella* cover was 6.6% and 4.4% in the *Mytilus* and *Tetraclita* plots, respectively. Mussels only comprised 2% of one *Mytilus* plot (#816).

**29 October, Scorpion Rock**, low tide -0.1 ft at 1527. Sampling conditions were excellent again today with light swell/surge and wind. We sampled Site B at Scorpion Rock. There are five rockweed plots at the reef. Alex and I photographed the plots then Alex recorded and I scored. Both rockweeds, particularly *Hesperophycus*, appeared abundant and healthy. The plots had 42.2% *Hesperophycus* this year compared to 29.2% mean cover measured in fall 2012 and 9% measured in 2011.

Working together we spent nearly two hours searching the site and measuring black abalone. We measured 138 individuals and counted 65 others totaling N=203 including one juvenile red abalone (size=50mm). For reference, in fall 2011 only 4 black abalone were observed at Site A and only 29 individuals were seen at Site B. Importantly however, there was a much higher level of search effort spent conducting the abalone surveys this year compared with previous years. It is unlikely that abalone abundances increased in the interim between surveys since the majority of abalone were approx. 80-130mm indicating that the animals were at least several years old. Additionally, most of the black abalone were seen within the boulder habitat between the reef on the northern end of the site and the rockweed plots (an area that is not usually surveyed adequately).

We worked the site from 1400 to 1800 and departed the next day on the regularly-scheduled Park boat.

Table 23. *Haliotis cracherodii* (black abalone) counts at Scorpion Rock, Santa Cruz Island, fall 2012.

| Plot | Count<br>Random | Count<br>Sized | Mean<br>Size | StDev | Min<br>Size | Max<br>Size | %<45mm | %45 -<br>126mm | %127 -<br>145mm | %>145mm |
|------|-----------------|----------------|--------------|-------|-------------|-------------|--------|----------------|-----------------|---------|
| 6    | 31              | 31             | 64.13        | 28.61 | 20          | 120         | 25.81% | 74.19%         | -               | -       |
| 7    | 138             | 138            | 93.88        | 22.88 | 20          | 145         | 0.72%  | 86.96%         | 12.32%          | -       |

Table 24. Photoplot summary – mean percent cover by zone at Scorpion Rock, Santa Cruz Island, fall 2012 (5 plots/zone).

| Site | ZoneName      | Bare Rock | Barnacle | Tetraclita | Endocladia | Hespero-phycus | Silvetia | Mussels | Turfweed | Leaf Barnacle | Misc Algae | Misc Animal | tar | Other |
|------|---------------|-----------|----------|------------|------------|----------------|----------|---------|----------|---------------|------------|-------------|-----|-------|
| SR   | Barnacle      | 34.6      | 25.2     | 1.4        | 37.2       | 0.0            | 0.0      | 0.0     | 0.0      | 0.0           | 0.6        | 1.0         | 0.0 | 0.0   |
| SR   | Endocladia    | 19.8      | 4.6      | 3.2        | 52.8       | 0.0            | 0.2      | 1.4     | 0.0      | 0.6           | 17.2       | 0.2         | 0.0 | 0.0   |
| SR   | Mussels       | 19.0      | 0.0      | 27.8       | 1.2        | 0.0            | 0.0      | 0.4     | 1.6      | 0.0           | 44.6       | 5.4         | 0.0 | 0.0   |
| SR   | Tetraclita    | 23.8      | 3.6      | 59.2       | 1.6        | 0.0            | 0.0      | 0.0     | 0.0      | 0.0           | 9.4        | 2.4         | 0.0 | 0.0   |
| SR   | Hesperophycus | 16.6      | 0.0      | 0.0        | 26.4       | 42.2           | 7.4      | 0.4     | 0.0      | 0.6           | 5.6        | 0.8         | 0.0 | 0.0   |

## **Santa Barbara Island**

November 12-14, 2012

(Database event #2012-G)

Prepared by Stephen Whitaker

**PERSONNEL:** Stephen Whitaker, Bio-tech, Channel Islands National Park  
Joshua Sprague, Bio-tech, CINP

**PROCEDURE and general observations:** Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus 1030 digital camera. All photoplots were scored in the field. Counts were not made of motile invertebrates inside the photoplots. Thirty-minute searches were conducted to count seastars and black abalone at both sites. The maximum number of shorebirds and pinnipeds observed at each site was recorded.

**12 November 2012. Landing Cove.** Low tide -0.8 ft at 1410 hrs. Conditions were excellent with clear sky, minimal (1-2') swell and light wind. There were three western gulls on the reef south of the pier and 26 California sea lions hauled out on the north monitoring reef. Within the cove, 104 sea lions (mostly juveniles) along with two black oystercatchers were observed. We were onsite from 1200-1730 hrs.

We came out on the Ocean Ranger today (Veteran's Day) as part of a specially-scheduled trip by Laurie Harvey to exchange VIPs conducting plant restoration on the island. Timing for the trip was perfect for our needs to conduct intertidal monitoring since it allowed us just enough time to monitor both sites on the island without having to spend an entire tour out there. Admittedly, we could have used one more day on the island to make repairs to most of the plot markers at Sea Lion Rookery which were in desperate need of attention.

We worked together to photograph the plots on the south side of the site. Then I scored the plots while Josh counted/measured sea stars (N=97) and searched the site for black abalone (N=1, 70mm). Most plots were easy to find aside from 326 and 327 which were both missing upper bolts. As observed during our visit here last year, both plots were densely populated with mussels. In fact, mussel cover appeared to be higher than past visits with dense recruitment seen throughout.

After completing the field log, we crossed the chasm to the 10 remaining plots on the north side of the cove. We photographed together then Josh recorded for me as I scored the plots. Surprisingly, all the plots were located relatively easily; a task which was likely simplified due to the lack of swell/surge. A bolt was installed in the upper-right corner of plots 326 and 327 before we departed at near-darkness. Numerous other plots were missing corner markers, but we were unable to attend to them due to the incoming tide. Note that I ended up taking a very cold dip in the Pacific Ocean prior to leaving the site to retrieve a quadrat that was taken by a set wave. Fortunately, dense *Eisenia* blocked the quadrat from completely falling off the edge of the reef!

Barnacle plots had extremely low *Balanus/Chthamalus* cover (only 2 plots had 1% cover, all others measured 0%) and appear to be transitioning to a community more representative of the mid to lower intertidal zone. In the barnacle plots, *Tetraclita* cover ranged 5-20% (mean=15.8%), *Mytilus* mean cover was 28.8%, *Gelidium/Pterocladia* cover averaged 14.8%, *Mazzaella* averaged 2.8% and *Ulva* averaged 2.2% among other less abundant taxa. *Silvetia* plots only had 1.6% mean rockweed cover; the most abundant species assemblages were *Mytilus* (mean=27%), *Gelidium/Pterocladia* (mean=19.6%), *Mazzaella* (mean=16.4%), *Ulva* (mean=10.6%) and *Chondracanthus* (mean=6.4%). Red turf plots were again dominated by *Chondracanthus* (mean=20.4%) and *Gelidium/Pterocladia* (mean=13.4%). Mussels accounted for 36.8% of the plots and articulated corallines averaged 5.2%. Mussel cover in *Mytilus* plots ranged 65-92% and averaged 79.4%. The next most abundant species in mussel plots was *Egregia* (mean=5.8%).

*Pisaster ochraceus* sizes ranged 30-170mm (mode=90mm) and 97 were found during a 30-minute timed count. For reference, 157 stars were found here last fall and 375 sea stars were seen in 2010. The decline in sea star abundance may be a factor explaining the relatively high densities of mussels at the site. Only one abalone was observed during a timed search of the entire site. The abalone (approx. 70mm) was found in a shallow crevice near plot 328.

Motile invertebrates were not counted during this visit. For reference, the following is an excerpt from the 2011 trip report:

Motile invertebrates were relatively abundant and diverse within the barnacle plots. On average, 5.2 *Lepidochitona*, 7.2 *Nuttalina* and 5.6 *Ocenebra circumtexta* were found in the barnacle plots along with very few littorine snails, and low to moderate numbers of small and medium-sized limpets. *Silvetia* plots averaged 0.4 *Lepidochitona*, 1.2 *Nuttalina*, 1 *Pachygrapsus*, 1.4 *Pagurus*, 4.6 *Ocenebra* sp. per plot with spotty occurrences of several other motile taxa. Littorine snails and small limpets were scarce, but medium-sized limpets were moderately abundant in the rockweed plots. We encountered the same snail that was difficult to identify last fall. We are tentatively calling it *Ocenebra* sp. since it primarily bears the same characteristics as *Ocenebra circumtexta* (the snail in question has a shell that appears more worn down). *Mytilus* plots averaged 1.2 *Lepidochitona*, 5.2 *Nuttalina*, 1.2 *Pachygrapsus* and 15.2 *Ocenebra circumtexta* per plot among other rare-occurring taxa. Medium-sized limpets were moderately common and small limpets were rare in the mussel zone. We do not count motile invertebrates in red turf plots.

**13 November 2012. Sea Lion Rookery.** Low tide -1.2 at 1455 hrs. Excellent conditions prevailed with overcast sky, calm wind and light swell/surge (2-3'). We used kayaks to access the site leaving the pier around 0930 and spending approximately two hours exploring the southeast side of the island while the tide receded. Upon arrival, approximately 200 or more sea lions (mostly mothers and pups with several large males present) were seen in the vicinity of the monitoring site. In addition, there were 4 black oystercatchers and 12 western gulls nearby. We were on site from 1215-1630 hrs.

We worked together to locate and photograph the plots. It took an exorbitant amount of time to find all the plots due to the fact that nearly all plots were missing corners. Some, including most of the mussel plots only had one marker present. We referenced the photos of the *Mytilus* plots in the island

binder to determine proper orientation. This site is in desperate need plot maintenance. We will dedicate at least one low tide to marking plots during the next visit.

Stephen scored all plots except the mussel plots, which were all nearly 100% cover of *Mytilus*. The remaining plots appeared to be heavily disturbed as a result of trampling from the sea lions and were composed largely of turf algae (*Gelidium*, *Chondracanthus*, *Mazzaella*, *Ulva*). There were no distinct biotic zones throughout the site. Mussel cover was much higher than observed during previous visits. As usual the site was dominated by *Ulva*.

Josh counted/measured sea stars (N=145) and searched for abalone (N=0) for 30 minutes. Sizes of *Pisaster ochraceus* ranged (30-140mm) with most measuring 110mm. For reference, N=183 sea stars were counted last fall and N=487 were seen in 2010.

Barnacle plots only averaged 2.8% *Balanus/Chthamalus* cover but had 48.8% *Ulva*. *Endocladia* plots had 7.4% mean *Endocladia* cover along with 36.2% *Ulva*, 15.6% *Mazzaella*, 7.6% *Tetraclita* cover and 2.4% *Mytilus* among other less common taxa. Rockweed plots averaged 16.8% *Silvetia*, 32.6% *Mazzaella*, 14.2% *Gelidium/Pterocladia* and 9.2% *Ulva* cover along with scarce amounts of several other taxa. *Mytilus* plots were primarily composed of mussels (mean=97.6%).

Motile invertebrates were not counted during this visit. For reference, the following is an excerpt from the 2011 trip report:

Motile invertebrates were not common in the barnacle plots with the exception of littorine snails. A couple of the barnacle plots had 1-11 *Ocenebra* sp. present along with 1-2 *Pachygrapsus* and large limpets. *Endocladia* plots primarily had large limpets (mean=2.6) and *Ocenebra circumtexta* (1-10 present in two plots), and sporadic occurrences of *Nuttalina*, *Pachygrapsus* and *Ocenebra* sp. Limpets and littorines were rare in the *Endocladia* zone. *Silvetia* plots averaged 9.8 *Pagurus*, 4.6 large limpets, 3.6 *Ocenebra* sp., 1.6 *Lepidochitona* and 1.4 *Ocenebra circumtexta* among other less abundant species. *Mytilus* plots primarily had *Ocenebra circumtexta* (mean=9.4), *Fissurella* (mean=10.8), *Nuttalina* (mean=8.8), *Strongylocentrotus purpuratus* (mean=8.4) and *Pachygrapsus* (mean=3.8). Littorine snails and small limpets were nonexistent and rare, respectively in the mussel plots, but mid-sized limpets were moderately abundant.

**14 November 2012.** Today was a cleaning and travel day. We helped the seabird group do some light maintenance and cleaned the bunkhouse. Travel back to Ventura was on the regularly-scheduled Ocean Ranger.

## **Anacapa Island November 25-28, 2012**

(Database event #2012-H)

Prepared by Stephen Whitaker

**PERSONNEL:** Stephen Whitaker, Bio-tech, Channel Islands National Park  
Joshua Sprague, Bio-tech, CINP

### **Procedure and General Notes:**

One of the Park Rangers (Merrill McCauley) provided transportation to East Anacapa on Sunday, November 25<sup>th</sup>. Kayaks were used to travel from East Anacapa to Cat Rock and Middle Anacapa daily. Standard procedures were followed for photographing and field- scoring fixed plots. Black abalone, *Haliotis cracherodii*, and seastars were counted in 30-minute searches at all three sites. Black abalone presence was not assessed at Harbor Seal Arch during this tour due to time constraints. Owl limpets, *Lottia gigantea*, were measured in fixed one-meter radius plots at the three sampling sites. The highest number of shorebirds and pinnipeds seen was recorded at all sites as well. The Park provided transportation back to Ventura on Wednesday, November 28<sup>th</sup>.

### **Results (Daily and Site Description)**

November 25, 2012. South Frenchy's Cove, Anacapa Island. Low tide -0.3 ft at 1518 hrs. We were transported to the island on one of the protection skiffs. Conditions were windier than expected. Fortunately, Merrill offered to take us to Frenchy's Cove and pick us up at the end of the day. After dropping our gear at the pier, we gathered our sampling equipment and boarded the skiff again. We arrived at Frenchy's around 1100.

Ocean conditions were mild with light swell/surge (2-3') and medium wind (10-15mph). One western gull and two black oystercatchers were seen at the site upon arrival. We were on site from 1130-1545.

Josh and Stephen worked together to photograph the inshore plots and Stephen scored them. When the tide receded enough, both photographed and scored the remaining plots on the outer reefs. All plots were scored in the field except 250 and 256-257. Josh counted *Pisaster ochraceus* (N=17) for 30 minutes. There were not enough sea stars present to generate a statistically-valid size frequency so measurements were not taken. Josh also surveyed the entire site for black abalone presence but did not encounter any. A bolt was added to both lower corners of plots 264 and 266. Motile invertebrates were not sampled at this site this season. Stephen counted and measured *Lottia gigantea* in the three permanent circular plots (N=1, 9, and 5 in plots 1-3, respectively). Sizes of owl limpets ranged 37-57 mm.

Sand level at the site appeared to be higher than usual. Yet, plots on the in shore reef were not as inundated with sand as has been observed during previous visits. The mid-intertidal seaweeds (both species of rockweeds, *Endocladia*, *Mazzaella* and *Mastocarpus*) were quite abundant and appeared healthy despite slight bleaching. *Mytilus* was common on the outer reef. *Septifer* recruitment was

high on the inshore reef. No purple urchins were seen. In the lower intertidal, *Egorgia* appeared small and tattered and neither *Eisenia* nor *Halidrys* were observed. *Cancer antennarius* was common particularly in the deeper tidepools. As observed in the past, the articulated coralline alga, *Jania crassa* was prevalent on the inshore reef.

**November 26, 2012. Cat Rock, Anacapa Island.** Low tide -0.2 ft at 1447 hrs. Conditions were excellent for sampling and travel via kayaks. Swell/surge and wind were practically nonexistent all day long and sky was overcast. Water temperature was 17.1 degrees Celsius. One western gull, 4 black oystercatchers and one American oystercatcher were seen at the site upon arrival. In the vicinity of the site, 10 black oystercatchers, 2 American oystercatchers and 2 brown pelicans were observed flying and landing on adjacent reefs. No pinnipeds were seen on the south side of the island.

Departure from the pier at Landing Cove occurred at approximately 1015. Two kayaks were used to travel to Frenchy's Cove taking about 60 minutes. After beaching the kayaks we walked to Cat Rock and were on site from 1220-1515. All plots were photographed first. Nearly all the plot markers for the 36 plots were in remarkably-good shape which greatly facilitated locating them. Due to time constraints (late low tide and the need to return via kayaks before dark) we did not score any of the plots in the field or conduct counts for motile invertebrates.

Stephen searched for black abalone (N=13) and Josh located (N=22) *Pisaster ochraceus* during a 30-minute timed period. The sizes of abalone ranged 53-120 mm. Even though a small group (N=4) of abalone were seen within 1-10 cm apart, most individuals were spread 1-5 m from one another. There were not enough sea stars present to generate a statistically-valid size frequency so measurements were not taken. Josh recorded for me as I counted and measured *Lottia gigantea* in the three permanent circular plots. Plots 1-3 had N=42, 27, and 11 owl limpets, respectively. Sizes ranged 12-63 mm.

The plots at Cat Rock were scored in the office by Stephen. Barnacle cover within the *Balanus/Chthamalus* zone averaged 25.9% and mean *Endocladia* cover was 29.1%. *Endocladia* plots had 34.2% *Endocladia* and a relatively diverse assemblage of other taxa that each occurred in low abundances. In the *Silvetia* plots, *Endocladia* was the most common (37.3) space occupier followed by *Hesperophycus* (12.4%) and *Silvetia* (6.8%). *Mytilus* plots had 34% mean mussel cover, 15.3% *Tetraclita*, 14% articulated corallines, 10.8% coralline crusts and 3.6% *Gelidium/Pterocladia* cover.

**November 27, 2012, Anacapa Middle West, Anacapa Island.** Low tide -0.3 ft at 1518 hrs. Weather conditions remained excellent for sampling and kayaking. The sky was partly cloudy most of the day with some periods of clear sky in the early-late afternoon. In the vicinity of the site, several different species of shorebirds (1 western grebe, 2 gulls, 4 cormorants, 3 black oystercatchers, 1 pelican) along with 2 California sea lions and harbor seals were observed at various times throughout the day. We were on site from 1110-1600.

It took approximately 45 minutes to travel via kayaks from Landing Cove to the site. Josh and Stephen worked together to photograph the site then Josh downloaded the temperature logger, counted sea stars (N=343) for 30-minutes and collected measurements (sizes ranged 40-130 mm, mode=90 mm). He then conducted a similar search for black abalone (N=27) (sizes ranged 21-120 mm). Most abalone were located 1-10 cm apart. Stephen sampled the limpet plots finding n=31, n=5 and n=16 *Lottia gigantea* in plots 1-3, respectively. Sizes of limpets across all three plots ranged 14-66 mm. Stephen also scored all plots in the field which were all quite diverse and uniform in composition. The plots at this site are no longer in established biotic zones. Instead they all appear to be the same motley mix of species ranging from mussels to barnacles. Fortunately, we spent significant time last season conducting plot maintenance at this site. Otherwise the plots would have been incredibly difficult to locate due to the close proximity that most are to one another.

Barnacle cover within the *Balanus/Chthamalus* zone averaged 10.2% and mean *Endocladia* cover was 8% among other less abundant species. *Ulva* cover within the barnacle plots was 7.2%. *Endocladia* plots had 17.2% *Endocladia*, 16.2% *Mazzaella* and a relatively diverse assemblage of other taxa that each occurred in low abundances. Two *Endocladia* plots had 25-30% *Mytilus* cover. In the *Silvetia* plots, *Mazzaella* was the most common (20.8%) space occupier followed by *Tetracrita* (7.4%), *Endocladia* (7.4%) and *Chondracanthus* (10.8%). No rockweed was present within the *Silvetia* plots. *Mytilus* plots had 12.4% mean mussel cover, 28.4% articulated corallines, 19.2% *Mazzaella*, 6.4% *Tetracrita*, and 10.8% *Gelidium/Pterocladia* cover.

**November 28, 2012, Anacapa Island.**

The Park boat was utilized to travel back to Ventura.

## **Santa Cruz Island December 9-14, 2012**

(Database event #2012-I)

Prepared by Stephen Whitaker

**Personnel:** Stephen Whitaker, Biotech,

**PERSONNEL:** Stephen Whitaker, Bio-tech, Channel Islands National Park  
Jonathon Jones, VIP

### **Procedure and General Notes:**

Stephen Whitaker and Jonathon Jones took Island Packers out to Prisoners Harbor on December 9<sup>th</sup> and returned via IPCO on December 14<sup>th</sup>. 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. We stayed at the UC Natural Reserve System, field station for four nights and camped at Trailer one night. Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Most photoplots were scored in the field with the exception of the five tar plots at Fraser Cove. Sea stars and black abalone were counted at all sites. Surfgrass transects were sampled at Trailer and Fraser Cove. *Lottia gigantea* were sampled in fixed plots at Trailer, Fraser and Willows Anchorage. Motile invertebrates were not sampled at any site during this tour. The maximum number of shorebirds and pinnipeds observed at each site was recorded. Hobotemp Tidbit temperature loggers were downloaded. In addition to the four sites normally sampled on this tour, we sampled Valley Anchorage for black abalone presence.

**9 December, Prisoners Harbor**, low tide 0.1 ft at 1254. We arrived on site at 1145 and worked until 1615. Working conditions were excellent overall with light wind and swell. One western gull was observed on the reef at arrival. No other birds or pinnipeds were seen on the monitoring site during our visit, but when we arrived at the pier there was a huge school of baitfish visible from the surface, which was predated upon by 10-20 brown pelicans, approximately 20 western gulls, 100-200 cormorants, 1 harbor seal and a sealion.

Jonathon and Stephen photographed the plots and site. Stephen scored all plots. Jonathon counted 38 *P. ochraceus* (range=90-160mm) during a 30-minute search of the entire site. Three black abalone (sizes = 62, 100, 111mm) were found throughout the site during a 30 minute search. One was in its normal location near plot 831 and the other two were near plots 848 and 836.

The barnacle plots had 35.6% mean *Balanus/Chthamalus* cover. *Mytilus* (14%) and *Endocladia* (11.6%) were moderately abundant in the barnacle zone. The *Endocladia* plots had 17% mean *Endocladia* cover which was markedly down from 51% last season. Barnacles (mean=35.2%) were common in the five *Endocladia* plots. Only two *Mytilus* plots had mussels present (1-2%). *Phragmatopoma* (mean=14.8%), articulated corallines (mean=22%), *Chondracanthus* (mean=29%)

and *Mazzaella affinis* (mean=10.2%) were the most abundant assemblages and species in the mussel zone. The *Silvetia* zone only had *Silvetia* in three plots (mean=5.2%). Instead, *Mytilus* (mean=14.6%) and *Chthamalus/Balanus* (mean=44.8%) were dominant in the *Silvetia* zone. *Hesperophycus* plots only had 5.6% mean *Hesperophycus* cover, but mean barnacle and *Endocladia* cover was 43.6% and 15.2%, respectively in the five plots.

Overall, the site had high recruitment of mussels and *Balanus/Chthamalus*. *Scytosiphon* was abundant in the upper reaches of the western reef. Both species of rockweeds were common though *Hesperophycus* was slightly more abundant than *Silvetia*. Even though we did not have time to sample the motile invertebrate populations, counts for *Tegula*, *Acanthina* and *Nucella* appeared to be high particularly in the *Endocladia* and the *Hesperophycus* plots.

**10 December, Trailer**, low tide -0.6 ft at 1340. We drove over from the research station during the morning leaving around 0800 and arriving at Trailer around 1000. After setting up our tents we moved down to the site. Surf was small (2-3' NW) which made conditions conducive for sampling. Surfgrass transects were accessible but waves washed over them when the largest sets came through. Wind was gusty at times when the marine layer rolled on and offshore. Six black oystercatchers were seen at the site upon arrival. No pinnipeds were observed at the site. The occasional cormorant or gull flew over throughout the day. We monitored the site from 1045 to 1615 hrs.

Stephen and Jonathon shot photos of the plots and site. Jonathon recorded for Stephen as he scored the surfgrass transects. *Phyllospadix* overstory cover was 54%, 67% and 21% on transects 1-3, respectively. Other red algae were the most dominant taxa in the transects not including surfgrass. Jonathon counted sea stars for 30-minutes finding 224 *Pisaster ochraceus* throughout the site. Sizes for *P. ochraceus* ranged 60-130 mm and the mode was 100 mm. Stephen searched for black abalone and found 44 individuals throughout the site during a 30-minute count. Sizes of abalone throughout the site ranged 60-168 mm. Most abalone were seen within 1-10 cm of another individual.

Stephen scored plots in the field. *Balanus* and *Chthamalus* were common in the barnacle plots (mean=35.6%). *Silvetia* was common (mean cover=57.2% in the *Silvetia* plots) and appeared healthy. *Hesperophycus* was scarce (mean cover=9.5% in the *Hesperophycus* plots). *Endocladia* appeared thick and healthy (mean cover=14.2% in the *Hesperophycus* plots). Even though motile invertebrate counts were not conducted it was obvious that *Tegula funebris* were still extremely abundant at the site.

**11 December, Fraser Cove**, low tide -1.1 ft at 1426. Surf was medium-sized (3-4' NW) but conditions were not hazardous and were conducive to sampling. Surfgrass transects were accessible. Wind was light and sky was cloudy all morning. Four black oystercatchers were seen at Fraser. One harbor seal was observed swimming in the cove. At Forney's, numerous sealions were seen on the southern portion of the reef. We monitored the two sites from 1030 to 1715 hrs.

Stephen and Jonathon photographed the plots and panoramas as the tide receded. Stephen scored all the plots except those in the tar zone with Jonathon recording. At Fraser, Jonathon counted *Pisaster* (n=139 (range=70-150mm, modes=110 and 130mm) and Stephen searched for black abalone (n=1,

size = 90mm) for 30 minutes. Stephen scored surfgrass transects. However, it was later determined that T-1 was incorrectly positioned, and therefore will be omitted. Overstory cover of surfgrass was 63 and 80% in the T-2 and T-3, respectively. The *Lottia gigantea* plots were scored by Stephen. Counts for plots 1-5 were N=12, 1, 11, 7, 5, respectively. The rockweed plots at Forney's were photographed and scored after completing the monitoring at Fraser.

Barnacle cover averaged 24.4% in the barnacle plots. Mean *Endocladia* cover was 31.6% throughout the *Endocladia* zone which was down from 70% last season. *Silvetia* comprised 21.2% of the total cover in the *Silvetia* plots and *Hesperophycus* mean cover was 39% in the representative zone. Mean *Endocladia* cover was 17.2% in the *Silvetia* plots and 19.6% in the *Hesperophycus* zone. The *Pollicipes* plots only had a mean cover of 15% for *Pollicipes*, but *Mytilus* were fairly abundant within the *Pollicipes* plots averaging 42%. *Phragmatopoma* was present in all five plots averaging 7.8%. *Mytilus* cover averaged 71% in the mussel plots. Tar cover in the tar plots averaged 42.6%.

**12 December, Willows Anchorage**, low tide -1.5 at 1511 hrs. Small-sized swell/surge and light wind made for excellent sampling conditions throughout the day despite the intermittent drizzle/rain. Only one western gull was observed at the site. Two black oystercatchers were seen on the beach along with a sealion pup and a harbor seal was seen swimming in the cove. The site was monitored from 1130 to 1700 hrs.

Stephen and Jonathon shot photos of the plots and site. Stephen scored the plots. Jonathon downloaded the temperature logger, then counted and measured 266 *P. ochraceus* during a 30-minute search of the site and measured 62 individuals (sizes ranged 60-120mm, mode=90mm). Stephen located 404 black abalone in 30 minutes while only searching the portion of the site ranging from the beach to the *Endocladia* plots. 140 abalone were measured. Sizes ranged 36-125mm and most individuals were located 1-10cm apart. Black abalone were observed in other parts of the site. Four out of five owl limpet plots were sampled. Plot 5 was not located. *Lottia gigantea* counts in plots 1-4 were N=75, 34, 40, 7, respectively.

Mean *Endocladia* cover in the *Endocladia* plots was 39.4%, down from 62.2% last season. *Silvetia* and *Hesperophycus* were absent from all but one plot in each of their representative zones. *Endocladia* (mean=40.2%) occupied most of the space in the *Hesperophycus* plots. The *Silvetia* plots had relatively high cover of *Endocladia* (mean=22.4%) and *Mazzaella* (mean=20.4%) compared with other space-occupying species. Mean cover for *Mytilus* in the mussel plots was 53.8%. Articulated corallines occupied 19.4% of the mussel pots.

**13 December, Valley Anchorage**, low tide -1.6 ft at 1557 hrs. Air temperature was 14.1° C. Light breeze and virtually no swell and extreme low tide made for perfect sampling conditions. No birds or pinnipeds were seen on or nearby the site. We sampled the site from 1400-1645 hrs.

Jonathon counted 170 *P. ochraceus* during a 30-minute search of the reef and boulder field. He then measured 64 abalone (range=50-90mm). Stephen counted N=36 black abalone on the reef during a 20-minute search and N=172 abalone during a 30-minute search of the boulder field. Note that the

entire boulder field was not searched and numerous other abalone were observed but not counted or measured. N=164 black abalone were measured (sizes ranged 30-155mm).

**13 December**, Travel from SCI to Ventura via IPCO.

## San Miguel Island

January 8-15, 2013

Prepared by Stephen Whitaker

(Database event #2012-J)

**PURPOSE:** To conduct standard intertidal monitoring protocols at the four sites located on Santa Miguel Island.

**PERSONNEL:** Stephen Whitaker, Bio-tech, Channel Islands National Park  
Danielle Lipski, Research Specialist, Channel Islands National Marine Sanctuary

**PROCEDURE and general observations:** We flew out to the ranger station on 1/8 to drop our food and gear off, then we were flown out to the lake bed so that we could monitor at Otter Harbor. Standard procedures were used for monitoring rocky intertidal sites. All plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Photoplots were scored in the field at all sites except Otter Harbor. Thirty-minute searches were conducted to count seastars and black abalone. The maximum number of shorebirds and pinnipeds observed at each site was recorded. *Lottia gigantea* were sampled in fixed plots at Otter Harbor and Harris Point. Motile invertebrates were not sampled at any sites during this visit to the island.

**8 January 2013, Otter Harbor.** Low tide -0.7 ft at 1342 hrs. Conditions were amenable for working the entire site during the black abalone search. Swell/surge was moderate-sized (5-6') and northwest wind was light throughout the afternoon. From the bluff above the site, 3 gulls, 3 black oystercatchers and 52 harbor seals were observed at the site. The tolerant harbor seal that has been encountered at this site during past visits was present during the entire monitoring period. Stephen and Dani arrived at the site at 1225 and departed for the ranch at 1655.

Stephen and Dani photographed plots and panoramas then Dani searched for sea stars (72 *Pisaster ochraceus*/ 30 minutes) and measured 64 individuals (range=60-160mm, mode=110mm). Stephen counted black abalone (N=159) throughout the entire site for 30-minutes. With the aid of Dani recording, N=70 abalone were measured. Most individuals were either touching or located 1-10cm from another individual and sizes ranged 36-155mm. No repairs were necessary. There was not enough time available to score all the plots in the field, but plot 374 was scored since it is inherently difficult to score in the office from a photograph.

The five *Lottia gigantea* plots were sampled. Counts for plots 1-5 were N=19, 32, 21, 20 and 15, respectively. Sizes of limpets ranged 15-68mm.

Mean barnacle cover was 44.6% in the barnacle plots. Plot 374 has been dominated by red algae for many years and continues to be composed primarily of *Chondracanthus* and *Mazzaella*. *Endocladia* plots had 52.8% mean *Endocladia* cover along with scant abundances of other taxa. *Silvetia* plots only had *Silvetia* present in two plots (4-9% in both). The rockweed plots were instead dominated by 32.2% barnacle and 32% *Endocladia* cover. *Mytilus* plots had 50.4% mussels, 8.4% non-coralline

crust, 9.6% articulated corallines, 5% *Pollicipes* and 6% coralline crusts among other less common taxa.

Overall, the site looked similar to previous visits with *Porphyra* common in the upper intertidal (particularly on the east end of the site). *Endocladia* was abundant throughout the mid intertidal along with low densities of *Hesperophycus* and *Mazzaella*. There were dense assemblages of mussels present in the lower intertidal. *Balanus* and *Chthamalus* were both abundant but the latter genus was most dominant. *Silvetia* was only present in low quantities.

**9 January 2013, Crook Point.** Low tide -1.2 ft at 1427 hrs. Conditions were largely workable, but occasional sets of long period northwest swell (2-4') washed over the outer reef even during low tide. Wind was 5-10 mph when we arrived and gradually increased during the afternoon. There were 6 western gulls, approx. 40 cormorants, 2 black oystercatchers and 1 elephant seal at the site upon arrival. Additionally, there were two elephant seal bulls on the rock above the site, two elephant seals in the water and 3 seals on the beach located to the east of the site. Two commercial fishing vessels worked near Wyckoff Ledge the entire time we were on site (1140-1640). The temperature logger was downloaded on this trip.

Stephen and Dani photographed all plots and panoramas on the inside reef before moving to the outside reef to do the same for the remaining plots. Stephen then scored all plots with Dani recording. Dani searched for sea stars (97 *Pisaster ochraceus*/ 30 minutes) and measured 94 individuals (range=20-160mm, mode=100mm). Stephen counted black abalone (N=23) throughout the entire site for 30-minutes (5 more abalone were seen during an extended search). Most individuals were either located 1-5m from another individual and sizes ranged 65-155mm. Repairs were made to several plots during last season's visit, so most plots were in good shape. However, two plots (397 and 387) only had one corner marker present and needed attention. We did not conduct any repairs on this trip.

Barnacle plots had 32.4% mean *Balanus/Chthamalus* cover. The majority of space in all five plots was unoccupied bare rock. *Endocladia* plots averaged 14% *Endocladia*. Plot 387 was occupied by a relatively diverse community of algae and plot 389 had 49% *Mytilus*. *Silvetia* was absent from all representative plots except plot 398 (2%). *Silvetia* plot 400 had 34% *Hesperophycus*. Mussels were common in *Silvetia* plots (mean=28.8%). Plot 397 was 99% *Mytilus*. Mussels averaged 66.8% in the *Mytilus* zone. Numerous sipunculids were seen while cleaning plot corners in the mussel zone.

Stephen's observations of the reef: no change from last visit in March 2012, normal overall. Opportunistic species such as *Porphyra*, *Ulva* and *Scytosiphon* were common. *Anthopleura xanthogrammica* appeared to be more common than *A. sola*. One *Tonicella* was observed near the temp logger. Abundant large *Mytilus* present on outer reef. Rockweed presence was low and was comprised primarily of *Hesperophycus* (small Harris Point form). *Silvetia* was scarce.

**10 January 2013, Harris Point.** Low tide -1.5 ft at 1510 hrs. Conditions were poor due to a large swell (8-10') out of the northwest, high wind (30-40kt) and scattered showers. Still, we were able to safely access all photoplots and conduct extensive site searches for black abalone and sea stars. Many of the plots were wetted frequently throughout the day including during low tide. There were 2 black

oystercatchers and 5 harbor seals present when we arrived. Additionally we saw a small sea lion pup on a high rock at the site several hours after arrival. We arrived at the site at 1140 and departed at 1645.

All photoplots were photographed by Dani and Stephen. Stephen scored photoplots with Dani recording. Dani counted sea stars for 30 minutes finding 16 *Pisaster ochraceus* and 7 *Patiria miniata* throughout the site. Sizes of *P. ochraceus* ranged 140-180mm. Stephen searched for black abalone for the same amount of time and located nineteen individuals ranging 102-185mm in size throughout the entire site including the boulder field in the vicinity of R2. One individual (approx. 120mm) was observed in plot 443 and one was in the crevice transect. Repairs were made to corners on numerous plots last season making it fairly easy to locate plots during this visit. The limpet plots were not sampled due to lack of time, but we returned on 1/10 to monitor the plots and shoot the panoramas.

Barnacles (primarily *Balanus* spp.) averaged 73.2% in the representative plots. Mean *Endocladia* cover in the representative plots was 43.6%. Barnacle cover was moderately high (9%) in the *Endocladia* plots. *Hesperophycus* plots were primarily dominated by 48.2% mean *Hesperophycus*, 21.2% *Endocladia* and 1.8% barnacle cover. *Mytilus* plots mostly had 22.8% mean mussel cover, 20.2% non-coralline crust and 3.8% *Tetraclita*. *Tetraclita* plots were mostly colonized by 16.4% mean mussel, 23.2% mean non-coralline, 8.8% mean *Tetraclita* and 6% mean *Mazzaella*.

Overall, *Endocladia* was abundant throughout the site even in the lower intertidal areas dominated by mussels. *Balanus* were more dominant than *Chthamalus*. The small form of *Hesperophycus* was prevalent throughout the central and eastern portions of the site. No *Silvetia* was seen.

**11 January 2013, Cuyler Harbor.** Low tide -1.6 ft at 1551 hrs. Conditions were fair due to powerful swell (8-10' NW) and high wind (15-20mph NW). Despite getting sprayed from the occasional large waves that hit the reef, we were able to safely monitor all the photoplots and conduct extensive sitewide searches for black abalone and sea stars. No shorebirds or pinnipeds were observed at the site upon arrival, but two black oystercatchers were seen several hours after starting the monitoring. The following were seen walking to the site: approx. 210 elephant seals plus approx. 55 pups on beach, approx. 5 surf scoters in harbor, approx. 65 gulls around channel, 2 black oystercatchers on beach and 4 black turnstones on the rocks.

Stephen and Dani photographed plots and panoramas. Plots were then scored by Stephen with Dani recording. Dani searched for sea stars (50 *Pisaster ochraceus*/ 30 minutes) and measured most individuals (n=47, range=30-150mm, weak modes at 80mm and 120mm) at the site. Dani searched for black abalone throughout site, but found zero individuals. Work was performed from 1315 to 1700. No plots were repaired during this visit, but plots 401 and 404 need attention.

Barnacle cover averaged 45.4% and mean *Endocladia* cover was 24% in the barnacle plots. *Endocladia* plots had 32% mean *Endocladia* cover. *Silvetia* was only present (mean=10.4%) in two rockweed plots. *Mytilus* plots had 75.4% mean mussel cover, 4.2% *Pollicipes* and 3.4% mean *Phragmatopoma* cover among other less dominant taxa.

Overall, mussels remain dominant and quite large throughout the site. *Silvetia* is common but *Hesperophycus* is absent unlike that observed at Harris and Crook Points.

**12 January 2013, Harris Point.** Low tide -1.4 ft at 1632 hrs. Conditions were conducive for intertidal sampling despite the moderate wind (15-20kt) and swell (5-6') generated from low pressure system moving through the region. The purpose of revisiting the site was to sample the *Lottia gigantea* plots and photograph the panoramas.

Limpet plots 1-5 had N=3, 12, 17, 37 and 19, respectively. Sizes ranged 21-65mm. *Lottia limatula* were large and present in high numbers particularly in plot 1.

The beach at Simonton was sampled from 1300 to 1400 for carcasses, trash, birds and pinnipeds. Ian and the VIP fox tech joined Dani and Stephen for the survey. The area surveyed included the expanse of beach between Harris Point and the first cove encountered to the west. Approx. 60 adult elephant seals and 10 pups, 2 gulls, 4 willets and 5 black oystercatchers were present on the beach. No dead organisms were seen during the survey, but we were unable to conduct a thorough search of the beach due to the high number of pinnipeds present.

**15 January 2013,** Flew off the island to Ventura.

## **Santa Rosa Island**

January 22-29, 2013

Prepared by *Stephen Whitaker*

(Database event #2012-K)

**PURPOSE:** To monitor rocky intertidal sites at Santa Rosa Island (SRI).

**PERSONNEL:** Stephen Whitaker, Biological Technician, Channel Islands National Park  
Josh Sprague, Biological Technician, CINP  
Dan Richards, Marine Biologist, VIP  
Connie Jenkins, VIP

**PROCEDURE and general observations:** Park boat transportation was utilized to access the island. Standard procedures were used for monitoring rocky intertidal sites. Plots and site overviews were photographed with an Olympus Stylus 1030SW digital camera. Photoplots were scored in the field at Johnson's Lee, East Point and Ford Point. Photoplots were not scored in the field at Northwest-Talcott due to lack of time caused by impending storm. Fossil Reef was not monitored since the roads leading to the west end of the island were not accessible. Sea stars and black abalone were counted during 30-minute site-wide searches at all sites monitored. Surfgrass transects were read at Northwest-Talcott and East Point. *Lottia gigantea* were sampled this season at Johnson's Lee, Northwest-Talcott and Ford Point. Motile invertebrates were not sampled this season at any sites on SRI. The maximum number of shorebirds and pinnipeds observed at each site was recorded. Hobotemp Tidbit temperature loggers were only downloaded at Northwest-Talcott. Mussel sizes and mussel bed depth were not measured at any sites this season. The Park boat provided transportation off the island on 1/29.

**1/22/2013. Johnson's Lee.** Low tide 0.0 ft at 1357 hrs. The conditions were conducive to sampling with clear sky, calm wind and light (1-3') swell. There were 4 westermgulls, 5 black oystercatchers and 11 black turnstones along with 26 elephant seals (16 adults/ 10 pups) at the site upon arrival. The elephant seals were located on the beach in the center of the site between the two monitoring reefs. Water temperature was not recorded. The sand was considerably high compared to past visits whereby it filled the big tidepool at the base of the reef, but did not cover any of the photoplots or *Lottia* plots. The site was monitored from 1445 to 1740. Note that we arrived late (after low tide) to the site since we spent a large proportion of the day travelling to the island.

Plots were photographed by Stephen. Site panoramas were photographed by Stephen. Seventeen photoplots were scored in the field by Stephen. Plots 510 and 513 were not sampled due to lack of time and incoming tide.

A thirty-minute search was conducted for black abalone (*Haliotis cracherodii*) presence by Dan. N=12 black abalone were observed site-wide (sizes ranged 80-157 mm, most individuals were located 51-100 cm apart from one another).

A thirty-minute search was conducted for ochre star (*Pisaster ochraceus*) presence by Josh. N=379 ochre stars were observed site-wide (sizes ranged 20-190 mm, mode = 80 mm). Owl limpets (*Lottia gigantea*) were counted and measured in the fixed plots by Dan. Plots 1-5 had N=2, 14, 14, 6, 17 owl limpets, respectively (sizes ranged 15-103 mm). Mobile invertebrates were not sampled. The field log was completed by Stephen. The temperature logger was not downloaded.

No plot repairs were conducted at the site. Plot 510 was missing UL and LL corners.

The barnacle (*Chthamalus* spp./ *Balanus* spp.) had 40.2% mean barnacle cover. The majority of point contacts in the five plots were bare rock. *Endocladia* plots had 19% mean *Endocladia* cover. The majority of point contacts in the five plots were bare rock. Mussel (*Mytilus californianus*) plots had 34.3% mean cover overall including the four new plots. Without the additional plots the original five plots had 11% mean mussel cover (only plot 512 had mussels present). The majority of cover in the five original plots was occupied by *Phragmatopoma* (mean= 57.8%).

*Phragmatopoma* continues to have a dominant presence throughout the lower reaches of the site and is particularly abundant in plots 510, 511 and 513. *Mytilus* is common to abundant at most mid-low locations at the site and appears to be recruiting well since various size classes are present. The barnacle plots were populated with moderate abundances of *Chthamalus/Balanus* (all except plot 504). *Endocladia* was common in the upper reaches of the site but only comprised low to moderate cover in the representative zone. All other algae aside from *Chondracanthus canaliculatus* were absent or occurred in very low abundances.

**1/23/2013. Northwest-Talcott.** Low tide -0.2 ft at 1428 hrs. The conditions were conducive to sampling despite the moderate (10-15 SE) wind and powerful (8-10' NW) swell. Light drizzle began at approx. 1430 forcing us to halt sampling prematurely in order to drive back to housing before the roads became too wet and slippery. There were 1 western gull and 2 black oystercatchers along with one elephant seal (bull) at the site upon arrival. There were not any harbor seals present unlike our last visit to the site in spring when we were not able to sample the site without causing unwanted disturbance. Water temperature was 13.7 degrees Celsius. The site was monitored from 1245 to 1515.

Plots were photographed by Stephen and Josh. Site panoramas were photographed by Josh. No photoplots were scored in the field due to lack of time.

A thirty-minute search was conducted for black abalone (*Haliotis cracherodii*) presence by Dan. N=0 black abalone were observed site-wide.

A thirty-minute search was conducted for ochre star (*Pisaster ochraceus*) presence by Dan. N=3 ochre stars were observed site-wide.

Owl limpets (*Lottia gigantea*) were counted and measured in the fixed plots by Dan. Plots 1-5 had N=11, 3, 14, 0, 15 owl limpets, respectively (sizes ranged 26-102 mm).

Mobile invertebrates were not sampled this season. The temperature logger was downloaded by Dan.

Surfgrass transects were sampled by Stephen. Transects 1-3 had *Phyllospadix* cover = 99, 95, 59%, respectively. The field log was completed by Stephen.

No plot repairs were conducted during this visit, but several plots were very difficult to locate. Plots 555, 559, 550, 553, 554 are missing 1-2 corner markers. Many plots at this site would greatly benefit from the addition of bolts as markers since many are obscured by biota.

The barnacle (*Chthamalus* spp./ *Balanus* spp.) had 9.2% mean barnacle cover. The majority of point contacts in the five plots were bare rock. *Endocladia* plots had 11% mean *Endocladia* cover. The majority of point contacts in the five plots were bare rock. The rockweed plots had 45.2% mean *Silvetia* cover. Most of the cover within the rockweed zone was dominated by *Silvetia*. Mussel (*Mytilus californianus*) plots had 25.8% mean cover. The majority of cover in the five plots was occupied by *Mytilus*.

*Lottia gigantea* appears to be declining slightly in abundance at this site particularly in the plots. *Silvetia* remains abundant. *Endocladia* is very common. *Mytilus* and *Chthamalus* were low to moderately abundant. No *Hesperophycus* was seen.

**1/26/2013. East Point.** Low tide -0.6 ft at 1550 hrs. The conditions were decent with clear sky, moderate (10-15 NW) wind and moderate (3-4') swell. We walked to the site from the airstrip since the roads were still too wet to drive on after the rain (approx. 1") that occurred on 1/23-24. There were 10 brown pelicans, 30 cormorants, 2 black oystercatchers and 80 sanderlings at the site upon arrival. There were no pinnipeds observed at the site, but the beaches located northeast of the site were densely packed with elephant seals and harbor seals. Water temperature was 14.3 degrees Celsius. The site was monitored from 1315 to 1550.

Plots were photographed by Stephen and Josh. Site panoramas were photographed by Stephen. All the photoplots were scored in the field by Dan.

A thirty-minute search was conducted for black abalone (*Haliotis cracherodii*) presence by Stephen. N= 22 black abalone were observed site-wide (sizes ranged 90-157 mm, most individuals were located 1-10 cm apart from one another).

A thirty-minute search was conducted for ochre star (*Pisaster ochraceus*) presence by Josh. N=296 ochre stars were observed site-wide (sizes ranged 60-150 mm, mode = 80-90 mm).

Mobile invertebrates were not sampled this season.

Surfgrass transects were sampled by Stephen. Transects 1-3 had *Phyllospadix* cover = 100, 97 and 98%, respectively. The field log was completed by Stephen.

No plot repairs were conducted during this visit since all plot markers were intact.

The barnacle (*Chthamalus* spp./ *Balanus* spp.) had 39.6% mean barnacle cover. The majority of cover in the five plots was bare rock. *Endocladia* plots had 55% mean *Endocladia* cover. The *Silvetia* plots had 6.6% mean *Silvetia* cover; the plots were occupied by small quantities of diverse species,

but the majority of space in the plots was bare rock. The *Hesperophycus* plots had 27.4% mean *Hesperophycus* cover; *Endocladia* was also common (mean= 31%) in the five plots. Mussel (*Mytilus californianus*) was only present in 2/5 plots; cover ranged 83-85%. The majority of cover in the five mussel plots was occupied by *Chondracanthus* (mean=26.4%) and *Phragmatopoma* (mean=25.8%).

*Mytilus* was present in moderate abundance at the center of the site, but little to no recruitment was observed and 3/5 of representative plots were devoid of mussels. Both species of rockweeds along with *Endocladia* and *Mazzaella* were quite common throughout the mid-upper reaches of the site. *Anthopleura xanthogrammica* was common in the channel at the center of the site.

**1/27/2013. Ford Point.** Low tide -0.5 ft at 1617 hrs. The conditions were decent for monitoring with clear sky, moderate to high wind (15-25 mph) and moderate (2-4') swell. There were 2 black oystercatchers and 3 black turnstones at the site upon arrival. No pinnipeds were observed at the site, but the beach located east of the site was densely populated with elephant seals (adults and pups). Water temperature was 12.9 degrees Celsius. The site was monitored from 1315 to 1715.

Plots were photographed by Josh. Site panoramas were photographed by Stephen. All photoplots were scored in the field by Dan.

A thirty-minute search was conducted for black abalone (*Haliotis cracherodii*) presence by Stephen. N=57 black abalone were observed site-wide (sizes ranged 40-165 mm, most individuals were located 1-10 cm apart from one another).

A thirty-minute search was conducted for ochre star (*Pisaster ochraceus*) presence by Josh. N= 253 ochre stars were observed site-wide (sizes ranged 50-150 mm, mode = 60 mm).

Owl limpets (*Lottia gigantea*) were counted and measured in the fixed plots by Stephen. Plots 1-5 had 4, 0, 5, 6 and 29 owl limpets, respectively (sizes ranged 14-92 mm).

Mobile invertebrates were not sampled this season. The field log was completed by Stephen.

No plot repairs were conducted this season, but the *Lottia* plots are in need of replacement. Plots 531 and 532 were difficult to locate even though all the plot markers were intact.

The barnacle (*Chthamalus* spp./ *Balanus* spp.) had 20.2% mean barnacle cover. The majority of cover in the five plots was bare rock. *Endocladia* plots had 19.8% mean *Endocladia* cover. The majority of cover in the five plots was bare rock, but low abundances of various taxa including *Mytilus*, *Chondracanthus*, coralline crusts, articulated corallines, *Mazzaella affinis*, *Ulva* and *Phragmatopoma* were present. Mussel (*Mytilus californianus*) plots had 36.4% mean cover (mussels were only present in 3/5 plots). The mussel plots had moderate abundances of *Chondracanthus* (mean= 13.4%), articulated corallines (mean= 8%) and *Phragmatopoma* (mean= 14%). The splash zone plots were nearly 100% bare rock, but two plots had barnacles present.

*Phragmatopoma* was quite common in the lower reaches of the site particularly at the east end making some plots difficult to locate. *Mytilus* was common along with *Endocladia*. *Mazzaella* was

only present in low abundances. *Chthamalus/Balanus* were fairly abundant. No rockweeds were observed.

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**National Park Service**  
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