California Department of Parks and Recreation
Natural Resources Division

Monitoring Intertidal Invertebrates at Wilder Ranch State Park

by
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Introduction

The Santa Cruz coast is known for its beauty, recreational opportunities, and rich marine diversity. In 1992, the Santa Cruz coast was designated as part of Monterey Bay National Marine Sanctuary (MBNMS) because of its significant biological and physical richness. Approximately five miles of the Santa Cruz coastline is part of Wilder Ranch State Park, just north of the city of Santa Cruz. Most of the park coastline allows for recreational beach and ocean access for the public. The Wilder Beach Natural Preserve is a small section of the park coastline that is protected and does not allow public access. State Parks owns land up to the mean high tide plus 100 feet seaward at the coastline. The State Lands Commission owns title to the inter- and subtidal lands below the mean high tide. (State Parks is in the process of redesignating marine management areas and investigating leasing the inter- and subtidal lands from the State Lands Commission.) The bluffs above the ocean to Highway 1 are leased by State Parks to farmers, who are currently growing row crops ranging from organic vegetables to brussel sprouts, a more chemically-treated crop. The public has access along dirt farm roads to the sandy beaches and rocky intertidal of the ocean for recreation, i.e., picnics, surfing, walking, sunbathing, tidepooling, etc. However, human activities inside and outside of the park can be detrimental to the coast resources including coastal development, oil spills, non-point source pollution (agricultural and urban run-off) and more specifically to the park, visitor-related impacts like trampling and illegal harvesting of invertebrates at low tides. In order to best manage and protect the rocky intertidal at Wilder Ranch State Park, information regarding the present resources and changes to those resources at a local and regional basis are necessary.

Background Research

A brief search of the Moss Landing Marine Laboratories, Hopkins, and University of California at Santa Cruz (UCSC) online library catalogs yielded only one report on the rocky intertidal at Wilder Ranch State Park (see Contacts for website information). In 1980, Kathleen Dwyer et al. completed a coastal resources survey of Wilder Ranch State Park as her UCSC senior thesis. The physical features of the coastline were mapped and six representative sites were described. Two of these six sites, Strawberry and Three Mile beaches, had two permanent transects established in the intertidal area species comparisons. Unfortunately, this report did not include enough information to replicate this survey of 22 years ago.

Fortunately, Santa Cruz is part of the greater Monterey Bay area and is a relatively well-studied area. A plethora of academic, scientific, governmental agencies, and private entities are located nearby and conduct on-going studies in and around the Bay. Some of these entities are California Department of Fish and Game, Moss Landing Marine Laboratories (CSU consortium), and Long Marine Laboratory (UCSC). Dr. Andrew De Volgaere, research coordinator and senior scientist for the Monterey Bay Marine Sanctuary recommended two researchers, Dr. Pete Raimondi and Dr. John Pearse, both of whom conduct rocky intertidal monitoring in the Santa Cruz area. Dr. Pete Raimondi is a

biology professor at UCSC conducting intertidal and subtidal monitoring along the entire California coast as part of a Partnership for the Interdisciplinary Studies of Coastal Oceans (PISCO). On a more local level, Dr. John Pearse, UCSC professor emeritus, is the principal for a Sea Grant project using local high school students to monitor rocky intertidal sites in the Monterey Bay area. The following are summaries of their programs from telephone conversations I had with the researchers and their cost estimates for installation and monitoring of one rocky intertidal monitoring site.

Partnership for the Interdisciplinary Studies of Coastal Oceans (PISCO)

Dr. Raimondi began intertidal monitoring with a contract in the 1990's with Minerals Management Service to access intertidal communities in case of oil spill or damage occurred along the southern California coast. Current research sites are located from San Diego to San Francisco in California and sites in Oregon. However, there are no monitoring sites at Wilder Ranch State Park. The closest sites to Wilder Ranch are Terrace Point near Natural Bridges State Park and Sandhill Bluff about two miles north of the Wilder Ranch State Park. Dr. Raimondi is doing all the MBNMS intertidal monitoring and subtidal work.

The two methods used are comprehensive inventory and rocky intertidal communities monitoring. The comprehensive inventory is more intensive and conducted for two-three years collecting biodiversity information. The data are collected twice a year by his core staff of two-three people to detect seasonal changes.

The rocky intertidal communities monitoring method is modeled after the intertidal monitoring program used at Channel Islands National Park. This method is used to measure dynamic parameters of change or perturbations in the intertidal ecosystem, e.g., oil spills, impacts by human use, etc. Per Raimondi et al. 1999, permanent photo plots are used to monitor assemblages of numerous relatively sessile organisms, e.g., mussels, barnacles, anemones, rockweed, etc. For large motile organisms, permanent plots are also established. Permanent line transects are used to estimate cover of surf grasses. To document the overall site conditions, the site is videotaped and notes taken on organisms not found in photo plots. Controls have been established at state parks and reserves, i.e., Andrew Molera and Point Lobos, etc. Data are collected only once a year.

A total of six people are needed to collect the data in the field for the rocky intertidal communities monitoring. More specifically, two trained technicians and Dr. Raimondi collect the data in one day in the field (count, take photos, etc.) plus three people to record the data. One day in the laboratory scoring slides, entering data, etc. If State Parks hires Raimondi's group, he will analyze the data for free.

The most cost effective way is for State Parks to contract Raimondi's group, be trained in his protocol, and send the collected data to Dr. Raimondi for analyses. The estimated of cost of establishing one monitoring site is $2,700.00 and for sampling $2,605.00 (based on his salaried employees wages) as of October 2000 (see Appendix A for details of the

cost estimate). Site establishment is costly because of the equipment needed to permanently monument the site. Over the long term, monitoring the site will be half the initial cost because the site would already be permanently marked.

Sea Grant

The Sea Grant-supported monitoring project is an outgrowth of rocky intertidal monitoring that Dr. Pearse conducted with his UCSC students in Biology 161L (www.biology.ucsc.edu/classes/bio161l/index.html). He and his students collected data from monitoring sites 24 years later in order to compare the results. No intertidal research sites were located within Wilder Ranch State Park coastline. However, two of his monitoring sites were at Davenport (north) and at Natural Bridges State Park (south) of Wilder Ranch State Park.

The purpose of the Sea Grant project monitoring is to document changes in the rocky intertidal using indicator species with assistance from school groups and volunteers in an attempt to make monitoring sustainable over time. The long-term objective is to have standardized data collection. Currently, students from four high schools are monitoring intertidal areas at Natural Bridges (Aptos High), Soquel Point (Harbor High), and Point Pinos (Watsonville and Monterey High). The Natural Bridges site is just north and adjacent to Natural Bridges State Park.

The protocols are site specific and are dependent on the characteristics and species found at the site. A permanent transect is established through the high, mid, and low intertidal zones. Basically, data is collected in various ways along this transect using random quadrats quantifying smaller invertebrates (percent cover for the more numerous organisms) to counting larger organisms in a larger delineated area. Composition and relative abundance of indicator organisms are derived from the data collected. The methods used do not collect comprehensive species composition data. A website to make the data accessible and allow input of data into the database is being developed. The data collected by the volunteers is checked with the data collected from the same site by Dr. Raimondi's PISCO technicians (trained marine biologists). In previous checks, the volunteers and PISCO technicians data quality have been comparable.

Initially, the personnel needed include Sea Grant trainee (Dawn Osborn, UCSC doctorate student), teacher at a local school, and student volunteers and/or docents. Eventually the volunteer group (about 10 people or more) would be trained so that they can conduct the monitoring and enter the data on to the website independently. Basically, there would be no cost or little investment by the District to have this monitoring done.

Recommendations

In October 2000, MBNMS unveiled the Sanctuary Integrated Monitoring Network (SIMoN) document, their blueprint for comprehensive, long-term monitoring. SIMoN will encourage regional monitoring by generating research funding, integrate and interpret data in ecosystem context, and facilitate communication among scientists, agencies, and the public. The SIMoN document and more information about MBNMS can be viewed from the website at http://bonita.mbnms.nos.noaa.gov. IMAP

recommends that any intertidal or subtidal monitoring at Santa Cruz District be integrated with SIMoN and the Monterey Bay National Marine Sanctuary.

IMAP recommends using local expertise from nearby marine laboratories to assist or conduct additional or future inventory and monitoring work. Until a Sanctuary-wide rocky intertidal monitoring is established, Tim Hyland and IMAP decided the Sea Grant project monitoring headed by Dr. John Pearse would be adequate at this time. However, when the Santa Cruz District can afford the cost of inventory or more intensive monitoring, IMAP highly recommends adding a site at Wilder Ranch State Park using Dr. Raimondi's group because of the ability to compare the data regionally and west coast wide.

Actions

March 11, 2001

- To better understand the marine intertidal monitoring protocol used by Dr. Pearse, Sarah Lee and Tamara Sasaki (IMAP) and Shannon Hernandez (ESI Santa Cruz District) from State Parks observed and assisted with the data collection at the Natural Bridges site. We met Dr. Pearse, Dawn Osborn, and the Aptos High School volunteers. After being trained by Dr. Pearse, we started to collect and record the data. The protocol appeared to be relatively straight forward, repeatable, and easy to learn because the information collected were counts or percent cover on indicator organisms. A handout with color photographs of the indicator organisms were also provided.

October 24, 2001

- A kick-off meeting was held at Wilder Ranch State Park ranger office. The meeting participants included Dr. Pearse and his staff, Dawn Osborn and Christy Roe; Tim Hyland (Santa Cruz District Ecologist), John Buchanan (Supervising Ranger), and Tamara Sasaki (IMAP). Dr. Pearse gave an overview of his proposed monitoring followed by a discussion regarding logistics, liability, and communications. The Santa Cruz District (Tim Hyland) then assumed responsibility for the monitoring by Dr. Pearse from IMAP.

Literature Cited

Dwyer, K. R., L.C. Bauman, D.W. Moore, J.M. Bowsman, and N.K. Poland. 1980. Reconnaissance Survey of the Coastal Area of Wilder Ranch State Park. Senior thesis. University of California, Santa Cruz. 149 pages.

Raimondi, P.T., R.F. Ambrose, J.M. Engle, S.N. Murray, and M. Wilson. 1999. Monitoring of rocky intertidal resources along the Central and Southern California mainland: 3-year report for San Luis Obispo, Santa Barbara, and Orange Counties (Fall 1995-Spring 1998). Report to the Minerals Management Service. OCS Study MMS 14-35-0001-30761.

Contact Information

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The MLML/MBARI Research Library
www.mlml.calstate.edu/library
Search Moss Landing and other local university or agency online libraries, including UCSC, Hopkins Marine Laboratory, CSUMB, and Naval Post Graduate School.

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The initial impetus of Pearse's Sea Grant project was from his Biology 161L class he taught at UCSC, www.biology.ucsc.edu/classes/bio161l/index.html.

Appendix A

2000 PISCO Information and Estimate of Cost