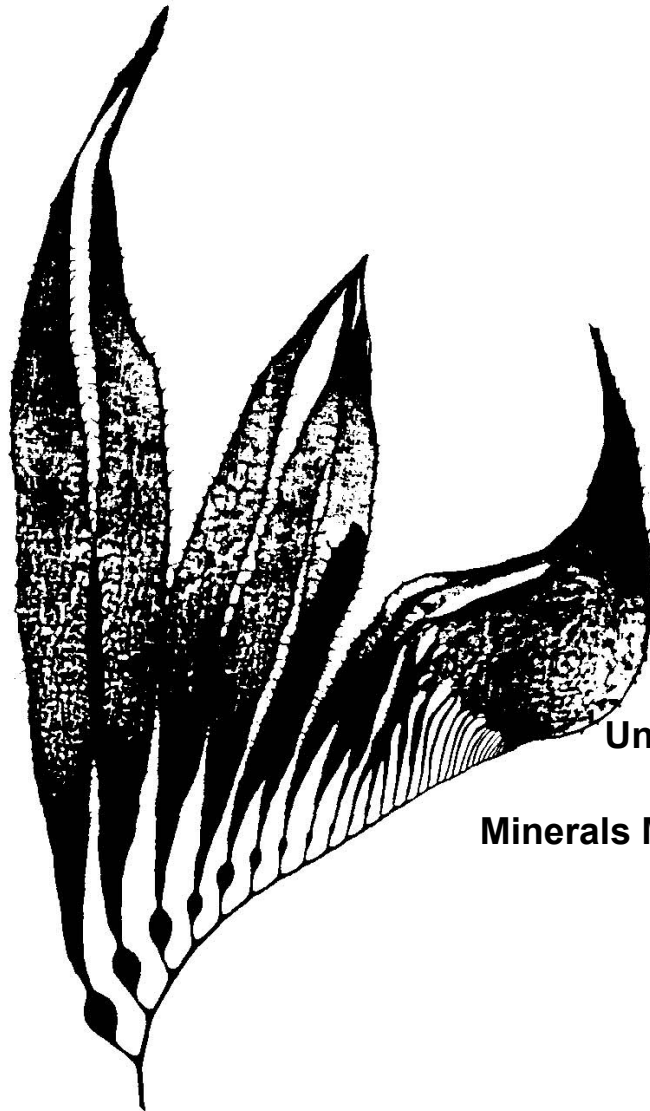


**COASTAL MARINE INSTITUTE  
PROGRAM YEAR 5  
QUARTERLY REPORT 1**

*for the period*

*July 1, 1998 – September 30, 1998*



*A Cooperative Program  
between the*  
**University of California**  
*and the*  
**Minerals Management Service**

*October 23, 1998*

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**Russell J. Schmitt**  
Program Manager

Coastal Research Center  
Marine Science Institute  
University of California  
Santa Barbara, California 93106

*October 23, 1998*

## Program Manager's Report

*for the period July 1, 1998 – September 30, 1998*

This constitutes the quarterly report for the first quarter for Program Year 5 of the Coastal Marine Institute, a cooperative research agreement between the Minerals Management Service, the state of California and the University of California.

As of this quarter, 11 projects currently are being conducted under the aegis of the Coastal Marine Institute.

### Actions Pending MMS Approval:

- Task 12390: *Testing and Calibrating the Measurement of Nonmarket Values for Oil Spills Via the Contingent Valuation Method*, has requested a no-cost extension;
- Task 12387: *Ecological Consequences of Alternative Abandonment Strategies for POCS Offshore Facilities and Implications for Policy Development*, has requested a no-cost extension.
- 

### Major Programmatic Progress and Actions during the Quarter:

- Task 13293: *Aerial Surveys of Marine Birds and Mammals in Santa Barbara Channel and the Santa Maria Basin* has been completed and the final study report will be submitted next month;
- Task 12392: *Development of Methods for Surfgrass (*Phyllospadix* spp.) Restoration Using Early Life History Stages* has been completed and the final study report will be submitted soon.

**Task 12387:** *Ecological Consequences of Alternative Abandonment Strategies for POCS Offshore Facilities and Implications for Policy Development*

**Principal Investigators:** **Mark H. Carr**, Department of Biology, University of California, Santa Cruz, CA 95064, **Graham E. Forrester**, Dept. of Biology, University of California, Los Angeles, CA 90095-1606, and **Michael V. McGinnis**, Coastal Research Center and Ocean and Coastal Policy Center, Marine Science Institute, University of California, Santa Barbara, CA 93106

**Major Accomplishments, July 1, 1998 through September 30, 1998**

We continued to focus our efforts on processing and analyzing data this past quarter. The primary tasks conducted this past quarter were:

Continued development of the database, integrating transect volumes with fish counts to estimate fish density by species and size class. Transect volumes are based on the lengths of structural members sampled on platforms. Divers and ROV-video recorded fish counts.

Statistical analysis of the diver collected databases were continued.

Processing of the ROV video tapes to determine fish size distributions (based on laser methods). Technicians and volunteers (one UCSC graduate student, one UCSC undergraduate, and two high school interns) located, measured, and recorded a total of 161 laser hits throughout 36 oil platform dives and 12 natural reef dives. This task is now approximately 75% completed.

McGinnis continues to prepare manuscripts from the comparative analyses he has conducted in the Pacific and Gulf coast regions.

**Problems Encountered:**

None.

**MMS Action Required:**

Approval of no-cost extension.

**Future plans:**

Further analysis and preparation of publications.

**Estimated Percentage of Budget Expended:**

Project Year 1	100%
Project Year 2	100%
Project Year 3	50%

**Task 12388:** *Joint UCSB-MMS Pacific OCS Student Internship and Trainee Program*

**Principal Investigators:** **Jenifer Dugan**, Coastal Research Center, Marine Science Institute, University California, California. 93106, and **Edward A. Keller**, Environmental Studies Program, University of California, Santa Barbara, California, 93106

**Major Accomplishments, July 1, 1998 – September 30, 1998**

During the past quarter, we hired one new student intern. Jeff Mason will work with Mike McCrary at MMS and Jenny Dugan at UCSB on the shorebirds project. John Dvorsky returned to do some additional work for Sig Larson at MMS. We advertised for several new intern positions and have received a couple of applications.

One Information Transfer Seminar was presented this past quarter by Harvey Molotch. Jenny Dugan is working with Fred Piltz to determine which projects should present talks next quarter and a seminar schedule is being developed.

**Future plans:**

New interns will be hired as needs are identified.

**Estimated Percentage of Budget Expended:**

Project Year 1: 100%  
Project Year 2: 100%  
Project Year 3: 20%

**Task 12392:** *Development of Methods for Surfgrass (Phyllospadix spp.) Restoration Using Early Life History Stages*

**Principal Investigators:** **Daniel C. Reed**, Marine Science Institute, University of California, Santa Barbara, CA 93106, **Sally J. Holbrook**, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106, and **Suzanne E. Worcester**, Marine Science Institute, University of California, Santa Barbara, CA 93106.

**Major Accomplishments, July 1, 1998 through September 30, 1998**

This was the first quarter of research for our project, which is a continuation of our previously funded UC-MMS Coastal Marine Institute studies on surfgrass restoration. We completed our semi-annual sampling of surfgrass abundance and reproductive state at ten of our eleven permanent intertidal sites and all five of our permanent subtidal sites. We were unable to sample one of our sites on Vandenberg Air Force Base (Stairs) because military security pertaining to missile launch operations prevented us from gaining access. We continued our monthly sampling of flowering state at a subset of our permanent sites (seven intertidal sites and one subtidal site) where we are also collecting data on seed dispersal and attachment (using seed traps) and seedling recruitment. All data collected to date have been entered into our data base and stored on a PC.

Observations from our seed trap data indicate that rates of seed predation can be quite high. We completed laboratory experiments that evaluated the foraging efficiency of the most likely seed predators, and we conducted field surveys of predator abundance at two of our intertidal seed trap sites to determine whether rates of seed predation vary with predator abundance. We also completed the construction of 30 predator exclusion cages, which will be used in a field experiment (planned for fall 1998) designed to test the effects of predators on the survival of attached seeds.

Collecting seeds from the field, maintaining them in laboratory culture, and cultivating seedlings from them continues to be an ongoing task during the flowering season. Large numbers of seeds and seedlings are needed for use in laboratory and field experiments on attachment and retention to host algae, predation, growth and survival.

**Problems Encountered:**

Access was denied to one of our intertidal sites. If this continues to be a problem this site will be dropped from our study.

**Future Plans:**

Work will proceed as scheduled.

**Estimated Percentage of Budget Expended:**

Project Year 1	100%
Project Year 2	100%
Project Year 3	100%

**Task 13092:** *Inventory of Rocky Intertidal Resources in San Luis Obispo, Santa Barbara and Orange Counties*

**Principal Investigators:** **Jack Engle**, Marine Science Institute, UC Santa Barbara, California, 93106, **Richard Ambrose**, Environmental Health and Safety, UC Los Angeles, California 90024, **Peter Raimondi**, Department of Biology, UC Santa Cruz, California 95064

**Major Accomplishments, July 1, 1998 through September 30, 1998**

The majority of the work for the Shoreline Inventory Project in San Luis Obispo (SLO), Santa Barbara (SBC), and Orange Counties (OC) during this quarter focused on analyzing data and writing the three-year report for the Minerals Management Service. This report includes the results of thirteen surveys of rocky intertidal resources at nine long-term monitoring sites in Santa Barbara County, six surveys at five sites in San Luis Obispo County, and four surveys at four sites in Orange County.

The following is a summary of our findings for individual species: *Anthopleura* cover decreased slightly over time at all sites where this species is sampled. At several sites, barnacle cover decreased over time, but fluctuations in cover were also common for this relatively short-lived species. *Pollicipes* cover at two sites was constant over time, but showed both a decreasing over-time trend, and a seasonal trend (with higher cover in fall) at the third site. Five out of the eleven sites where mussels are sampled showed a decreasing trend in cover over time. Two additional sites experienced declines in mussel cover during the final two samples. A decreasing over-time trend was also observed for *Pelvetia* at four of the seven sites where this rockweed is sampled. *Pelvetia* cover tended to be slightly higher in fall than in spring at four sites. At both sites where *Hesperophycus* is sampled, cover decreased substantially over time. *Mazzaella* cover decreased at one site, but remained stable over time at the other. Cover of the red-turf understory in *Mazzaella* plots appears to be seasonal, with higher cover in fall. Surf grass cover at four of seven sites showed higher cover in fall than in spring. Sand cover in surf grass plots was an important factor at several sites, particularly at Coal Oil Pt., where plants were frequently partially covered and, on one occasion, completely buried in sand. Seastar counts were variable from sample to sample at all sites. Both *Lottia* abundance and mean size were relatively constant over time at most sites. One exception is Boat House, where a decline in both limpet number and mean size occurred between spring and fall of 1996.

Dramatic declines in black abalone numbers occurred at several of the Santa Barbara County sites. Withering Syndrome (WS) has hit Government Pt., Boat House, and Stairs in sequential order, as can be see in the pattern of decline of abalone at these sites. Abalone have virtually disappeared from the intertidal at Government Pt., approximately 7% of the original number of abalone now exist at Boat House, and less than 5% of the numbers counted during peak abundance still remain at Stairs. Although abalone numbers at Purisima (the northernmost Santa Barbara Co. abalone site) had not decreased by the end of the study period, the site has since been re-visited, and numbers appeared to be on the decline. Counts were down by approximately 50 animals per plot

from the Spring 1998 sample when the site was re-sampled in June 1998, and withered animals were found throughout the site.

**Future Plans:**

In the next quarter we will complete the annual report for MMS, and sample sites in all three areas.

**Problems encountered:**

Funding has run out for this project and alternate funds are being used temporarily. New funding has arrived, but has not yet been processed. It is critical that we receive funds as soon as possible.

**MMS Action Required:**

None

**Estimated Percentage of Budget Expended:**

SLO, SBC and OC portions 100%



**Task 13094:** *Application of Coastal Ocean Dynamics Radars for Observation of Near-Surface Currents off the South-Central California Coast*

**Principal Investigators:** Libe Washburn, Department of Geography, University of California, Santa Barbara, CA 93106, Steven D. Gaines, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106

**Major Accomplishments, July 1, 1998 through September 30, 1998**

After a long series of interactions with personnel at Vandenberg Air Force Base (VAFB) we were finally granted permission to install two current-measuring radars (CODARs) on the base. Hooray!! These will be installed at Pt. Arguello and near Pt. Sal at a place designated by the Air Force as Fallback 22. We have begun the installation process. To date we have installed the sheds and weather-proof enclosures on the sites which will house the radar and computer equipment. Electrical power is being installed at both sites by a private electrical contractor at the time of this writing. The final hook-up for power will be done by VAFB personnel. Once this is completed we will install the transmit and receive antennas along with the radar electronics and data acquisition computers. The NOAA Environmental Testing Laboratory is planning to purchase two additional CODAR units for use by their collaborators in Oregon. They will then allow us to keep the CODAR systems they loaned us previously for an extended deployment in the two new sites on VAFB.

In June 1998 we used our near real-time CODAR observations of surface currents in the western Santa Barbara Channel to direct an ocean survey by fish ecologists at UCSB. A surprising result of that survey was the discovery that high concentrations of juvenile fishes were concentrated in a cyclonic eddy that was present during the field experiment. Concentrations of fishes in the eddy were factors of 10-100 higher than surrounding waters. During this quarter we have analyzed the large group of water property profiles that were collected during the fish surveys. This has revealed that the eddy visible in the surface currents extends to a depth of at least 200 m. We have also computed a time series of the mean vorticity to establish when the cyclonic circulation in the Channel was set up in the spring of 1998. Results of this work were recently presented at the 45<sup>th</sup> Eastern Pacific Ocean Conference, held at the Timberline Lodge on Mt. Hood Oregon. Other of our results were summarized in our contribution to the proceedings of the upcoming 5<sup>th</sup> Channel Islands Symposium. This manuscript was submitted earlier this month (September).

**Future Plans:**

We will continue our analysis of the extensive set of surface currents obtained to date in the Santa Barbara Channel. We will be working to get out two new CODAR sites up and operating as soon as possible.

**Estimated Percentage of Budget Expended:**

Project Year 1	100%
Project Year 2	100%
Project Year 3	52%

**Task 14181:** *Population Trends and Trophic Dynamics in Pacific OCS Ecosystems:  
What Can Monitoring Data Tell Us?*

**Principal Investigators:** **Russell J. Schmitt**, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106 and **Andrew J. Brooks**, Coastal Research Center, Marine Science Institute, University of California, Santa Barbara, CA 93106

**Major Accomplishments, July 1, 1998 through September 30, 1998**

Our MMS-UC CMI funded research encompasses two separate objectives: (1) the analysis and synthesis of existing long-term monitoring data and (2) the continued annual surveys of subtidal reef communities at Santa Cruz Island.

*(1) The analysis and synthesis of existing long-term monitoring data.*

We have continued with our efforts to obtain additional long-term datasets. With the exception of the data just collected, all of our Santa Cruz Island data has now been converted into an electronic format. We are currently using the Santa Cruz Island dataset to develop and test a relational database format constructed using Access. Once finished, this database format will then serve as the template for storing the data contained in our additional long-term datasets.

*(2) The continued annual surveys of subtidal reef communities at Santa Cruz Island.*

We have completed the second year of our monitoring of the abundances of surfperches, their invertebrate prey, and the cover of benthic microhabitats at the 11 permanent study sites on the south coast of Santa Cruz Island. Sampling of fish (via visual counts along permanent band transects) and of the cover of benthic microhabitats (via random point contact methods) were accomplished in the manner described in our proposal.

**Estimated Percentage of Budget Expended:**

Project Year 1    10%

**Task 15115:** *Effects of Produced Water on Complex Behavioral Traits of Invertebrate Larvae and Algal Zoospores*

**Principal Investigator:** Peter Raimondi, Department of Biology, University of California, Santa Cruz, CA 95064

**Summary:**

The laboratory and technical aspects of both of parts of this project are going very well. However, a major and fatal problem has arisen in our ability to procure Produced Water (PW). MMS is unable to guarantee that it can supply PW to us for further experiments. It seems this problem has arisen out of various oil companies inability or unwillingness to supply this particular project with the toxicant. This situation has stalled the work with PW, as the last supplies we had were used last month. After many months of talk and negotiation, we are at an impasse and do not know how much of the project can be completed without supplies of PW.

**Personnel, July 1<sup>st</sup> - October 1<sup>st</sup> 1998:**

During this period the Post-Doctoral Researcher, Anthony Boxshall, was the main researcher on this grant. At present, we have two students, Derek Smith and Dawn Baily helping with various aspects of this project. Derek Smith is a Work Study student and Dawn Baily is a volunteer.

**Major Accomplishments, July 1, 1998 through September 30, 1998**

The culturing of the local polychaete worm, *Phragmatapoma californica*, has been successful and experiments in the flow tank will begin this quarter. The experimental work using Abalone larvae is to commence in the coming weeks, well behind schedule. The problems with clean water supplies that were exasperated by the severe storm conditions of last winter have been overcome.

The series of field experiments in the Santa Cruz harbour looking at the growth of various adult bryozoans after spiked exposure of competent larvae to sub-lethal doses of produced water has been very successful. Experiments have been completed using *Watisipora subtorquata*, *Schizoporella unicornis* and *Bugula neritina*.

**Problems Encountered:**

As mentioned in the Summary, we are out of PW and may not be able to obtain more. We are concerned by this development. We had planned to run experiments assessing the similarity of behavioral effects due to PW from multiple sources. We have not commenced these due to the lack of a toxicant.

**Future plans:**

Larval behavior experiments in the flow tank will continue as scheduled. As will the field outplanting of adults grown from exposed larvae. However, only if we obtain PW will these experiments include the effects of the toxicant on larvae behavior. Our experiments are broad and interesting enough in a larval biology context to continue

without the toxicant, however our preference is to complete the experiments as we planned them.

**MMS Action Required:**

Assist us in obtaining further samples of PW.

**Estimated Percentage of Budget Expended:**

Project Year 1: 78%

**Task 15116:** *Wave Prediction in the Santa Barbara Channel*

**Principal Investigators:** **Robert T. Guza** and **William C. O'Reilly**, Center for Coastal Studies, Scripps Institution of Oceanography, La Jolla, CA 92093

**Major Accomplishments, July 1, 1998 through September 30, 1998**

During this 3<sup>rd</sup> quarter of the project a manuscript was prepared for the proceedings of the 5<sup>th</sup> CA Islands Symposium. The paper describes the present MMS-supported wave modeling efforts in the Santa Barbara Channel.

**Problems Encountered:**

None

**Future Plans:**

Acquire and analyze pressure sensor data collected along the Ventura County coastline by the U.S. Naval Postgraduate School in the winter of 1994-95.

**Estimate Percentage of Budget Expended:**

Project Year 1    65%

*Assessing Toxic Effects on Population Dynamics Using Individual-Based Energy Budget Models*

**Principal Investigators:** **Roger M. Nisbet**, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106 and **Erik B. Muller**, Marine Science Institute, University of California, Santa Barbara, CA 93106

**Major Accomplishments, July 1, 1998 through September 30, 1998**

The last quarter has been fully devoted to explore the behavior of model organisms in variable food environments. Variations in food supply imply that organisms periodically encounter stress, and this stress adds to other forms, such as the presence of toxic contaminants whose effects we modeled previously. We analyze the model with analytical and numerical means, and aim at conclusions that carry over to other modeling frameworks.

We are studying 2 forms of food variations: periodic fluctuations, which mimic alternating periods of low and high food availability, and stochastic fluctuations, which emphasize the unpredictability of the supply of food. Model organisms that live in an environment with periodically fluctuating food grow and reproduce more than their conspecifics in a constant environment, but they are also more likely to starve to death. This is not only because periodicity implies a bad season, but, more importantly, because organisms feast in the good season. As a result they grow to a size they cannot maintain in the bad season, upon which they die. Environmental parameters that contribute to this are the magnitude and the period of the fluctuations (if environmental changes are rapid relative to physiological rates, the effects are quite modest; if on the other hand the environment changes more slowly, the aforementioned effects will be more pronounced). Those results are underlined qualitatively by our results with stochastically variable food. Tentatively, the main difference seems to be that stochastic variations are milder for the organism than deterministic variations. Another eye catching result is that increasing the memory of the environment for previous events first reduces the survival rate, like the period in the deterministically fluctuating food environment, but that with further increasing the survival rate will go up. The reason is that the 'duration of memory' becomes closer to the life span, beyond which stochastic fluctuations have little impact. This effect is much less pronounced with deterministic variable food.

**Problems encountered:**

None

**Future Plans:**

As in proposal.

**Estimate Percentage of Budget Expended:**

Project Year 1 65%

