

**SOUTHERN CALIFORNIA EDUCATIONAL INITIATIVE
PROGRAM YEAR 12
QUARTERLY REPORT 2**

for the period

October 1, 2000 – December 31, 2000



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

January 16, 2001

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Russell J. Schmitt
Program Manager

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

January 16, 2001

Program Manager's Report

for the period October 1, 2000 – December 31, 2000

This constitutes the quarterly report for the second quarter of Program Year 12 of the Southern California Educational Initiative, a cooperative research agreement between the Minerals Management Service, the state of California and the University of California.

As of this quarter, 9 projects currently are being conducted under the aegis of the Southern California Educational Initiative.

Actions Pending MMS Approval:

- We are waiting for MMS comments on the Draft Final Report for *Mitigating the Impact of Offshore Oil Development*, Woolley and Lima, Pls.

Major programmatic progress and actions during the quarter are summarized below for the period of July 1 – September 30, 2000.

- The Final Report for project *Ecological Effects of Chronic Exposure to Produced Water: A Field Test* and *Environmental Effects of Produced Water: A BACIP Field Assessment*, Osenberg, Holbrook, Schmitt and Carr, Pls, will be submitted to MMS next quarter in hard copy and PDF formats;
- The Final Report for project *Effects of Produced Water on Demographic Rates and Environmental Recovery Following Cessation of a Produced Water Discharge*, Schmitt and Osenberg, Pls, will be submitted to MMS next quarter in hard copy and PDF formats;
- The Final Report for project *Inventory of Rocky Intertidal Resources in San Diego County*, Engle, PI, will be submitted to MMS next quarter in hard copy and PDF formats.

Effects of Biologically Degraded Oil on Marine Invertebrate and Vertebrate Embryos and Larvae

Principal Investigators: Gary N. Cherr, Bodega Marine Laboratory, University of California, Davis, CA 94923, Rick Higashi, Crocker Nuclear Laboratory, University of California, Davis, CA 95616, Frederick J. Griffin, Bodega Marine Laboratory, University of California, Davis, CA 94923.

Major Accomplishments, October 1, 2000 - December 31, 2000

We are in the final stages of completing studies on the toxic effects of BWSF to marine invertebrate larvae. Three major model species remain the focus of our investigations; these are, *Crassostrea gigas* (pacific oyster), *Lytechinus anamesus* (white urchin) and *Urechis caupo* (innkeeper worm). We have obtained a specific inhibitor of the MXR transporter which appears to impart resistance to PAHs in *Urechis*. We are just starting to use this inhibitor (termed "reversin") in order to confirm the MXR transporter's role in PAH tolerance. This compound will be used in both toxicity tests as well as in fluorescence assays.

The new fluorescence assay for MXR transporter activity, calcein AM, works very well and the final replicate experiments are now underway.

Future Plans:

We are in the final stages of preparing publications.

Estimated Percentage of Budget Expended:

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

Detecting Ecological Impacts: Effects of Taxonomic Aggregation in the Before-After/Control-Impact Paired Series Design

Principal Investigators: **Sally Holbrook**, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA 93106, **Mark H. Carr**, Department of Biology, University of California, Santa Cruz, CA 95064, **Craig W. Osenberg**, Department of Zoology, University of Florida, Gainesville, FL 32611-8525.

Major Accomplishments, October 1, 2000 - December 31, 2000

- Processing of bivalve and crustacean samples for size-frequency analysis continues in Carr's lab at UCSC with the image analysis system. At present, bivalve samples from Gaviota have been imaged and processing of *Carpinteria* samples continues. A senior thesis, being conducted in his lab is being completed and is entitled, "Effects of cessation of a produced water discharge on the size frequency of a bivalve, *Telina carpenterii*, off *Carpinteria*, California".
- We continue to contribute to the application of BACI methodology in other contexts. BACI and the SCEI projects were highlighted in a lecture in Carr and Raimondi's UCSC undergraduate course, "Conservation in the Sea". Osenberg was an invited participant in a workshop at Lee Stalking Island, Bahamas which had as one goal to interact with Bahamian agencies to assist in the design and monitoring of a marine reserve network.

Future plans:

- Osenberg will conduct data analyses during Spring and Summer 2001, now that files have been completely updated. At this time he also will fully document and archive these files for storage (on CD). As indicated in the 2000 Annual Report, we expect this to take until *at least the end of summer 2001*. We are also continuing our effort to have all samples not involved in size frequency analyses to be archived at the Los Angeles County Museum.

Estimated Percentage of Budget Expended:

All funds were expended earlier this year. As indicated in the 2000 Annual Report, the project will not be completed until at least summer 2001, due to unforeseen delays in the taxonomic identifications.

Effects of an Oil Spill on Multispecies Interactions that Structure Intertidal Communities

Principal Investigator: Peter Raimondi, Department of Biology, University of California, Santa Cruz, California 95460.

Major Accomplishments, October 1, 2000 - December 31, 2000

The plots established at Boathouse, on Vandenberg Airforce Base, were sampled in October 1999. Data was collected on the number and the sizes of barnacles in the cleared plots and the tarred plots. Barnacles were present in the cleared and the tarred plots. Aside from the 100% cleared/tarred treatment, the number of recruits was about equal in the tarred and the cleared plots. There was no distinct pattern in the number of recruits as a function of percent cleared/tarred.

After sampling the plots, 50% of the tar was removed from the tarred plots. Many dead tests were starting to come through the surface of the tar patches due to degradation eroded. Close to all of the barnacles were dead in the tar patch, as indicated by numerous empty tests coated with tar. A few barnacles were alive towards the center of the tar patch and appeared to have grown in a long, narrow form, similar to the form often observed when barnacles hummock. Barnacles on the edges of the tar patch were alive, indicating that barnacles can survive partial tar cover.

In November 1999, Christy Roe performed surveys at Point Sierra Nevada, Shell Beach and Boathouse. These surveys allowed her to calculate the percent cover of tar in two different zones (barnacle and *Endocladia*) and to do site comparisons. Overall, she found more tar at both Pt. Sierra Nevada and Boathouse and less tar at Shell Beach. She found that at both Pt. Sierra Nevada and Shell Beach that tar cover was consistently an order of magnitude higher in the barnacle zone as compared to the *Endocladia* zone. This result was consistent with what we expected, based on the analyzed slides from our data base and previous field observations. In contrast, at Boathouse the percent tar cover was an order of magnitude lower in the barnacle zone as compared to the *Endocladia* zone. This may be a result of the upwards shift in species assemblages at this site. We predict that with time (at Boathouse), the percent tar cover will increase in the barnacle zone and decrease in the *Endocladia* zone. The number, size and relative freshness of tar patches per marked plot were recorded at each of the three sites. Additionally at Pt. Sierra Nevada, four tar patches were found in the mussel zone (in contrast, no tar was found in the mussel zones at Shell Beach or Boathouse). These four tar patches were marked and measured in late October and when we returned to this site in early December all four of the patches had disappeared. This result was also as expected based on slide data and previous field observations that suggest tar does not persist long in the mussel zone.

Variability in tar patch persistence may result from temperature, zonation and wave exposure. These factors not only contribute to the weathering (degradation) of tar, but may also have an effect on where the tar lands. Christy has been utilizing a tide program to make predictions regarding variability in tar patch accumulation and persistence.

Future Plans:

Plots in which 50% of the tar was removed will be sampled in March. This will allow us to investigate how the barnacle populations recover from an oil spill once the tar has degraded.

We will continue to monitor both the number and size of tar patches, as well as the percent tar cover in the marked plots on a quarterly basis. We also plan to set up some experiments to measure variability in tar patch persistence as a function of species assemblage.

Personnel

Christy Roe is funded 2/3 time as a laboratory technician on the project.
Samantha Forde is funded as a graduate student research assistant.

Inventory of Rocky Intertidal Resources in San Luis Obispo and Northern Santa Barbara Counties

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

Major Accomplishments July 1, 2000-September 30, 2000

During this quarter the 10 study sites in San Luis Obispo (SLO) and Northern Santa Barbara (NSB) Counties were sampled for the 11th and 18th semi-annual surveys respectively. In addition, data were compiled and analyzed for a presentation given at the December 2000 PISCO (Partnership for the Interdisciplinary Studies of Coastal Oceans) meeting in Corvallis, Oregon. Principal component analyses of photoplot species data revealed that sites clearly divided into two groups: those north of Pt. Conception and those south of this biogeographic barrier. In addition, these analyses showed that many sites experienced severe changes in species composition following the 1997/98 El Niño storms. These types of patterns can only be seen in long-term monitoring data sets.

Future Plans:

Effort in the next quarter will focus on scoring photographic slides, entering these percent cover data along with field data into computer files, and preparing for the next set of sampling trips which will begin in early March, 2001.

Problems encountered:

None

MMS Action Required:

None

Estimated Percentage of Budget Expended:

Project Year 1 100%

Inventory of Rocky Intertidal Resources in Los Angeles, Ventura, and Southern Santa Barbara Counties

Principal Investigator: Dr. Richard F. Ambrose, Dept. of Environmental Health Sciences and Environmental Science and Engineering Program, University of California, Los Angeles, CA 90095-1772

Major Accomplishments, October 1, 2000 - December 31, 2000

During this quarter, the bulk of our efforts revolved around the planning and execution of the Fall 2000 sampling, as well as miscellaneous tasks relating to the project as a whole. Beginning in this quarter, the salary of the technician, Steven Lee, was reduced to 75% time. The Fall 2000 sampling occurred throughout the months of November and December (Table 1.) All sampling went smoothly without any major problems. This season marked the beginning of motile invertebrate data collection within the photoplot quadrats. Mobile invertebrate data were taken within *Chthamalus*, Mussel, *Endocladia*, and *Pelvetia* photoplots. No mobile invertebrate data were collected within *Balanus*, *Pollicipes*, or Anemones plots. In all cases, the entire plot was sampled without subsampling. In the future, subsampling will be done when possible due to the time demands of a complete survey when mobile invertebrate densities are high. In addition, a new seastar protocol was implemented this season, with seastar radius measurements collected in addition to simple counts. Data and photographic image management was fit in around the sampling schedule. All the photoplot slides were developed, labeled and organized, but the slide scoring was postponed until after the New Year. The remainder of the data was entered into the computer files. Many, but not all, of the images from the Fall 2000 sampling were scanned into the computer for archiving. During this quarter we received some of the items that were purchased for us by MMS. These included a new Dell Computer, a Laser leveler, Adobe PhotoShop software, and several meter tapes. Preparations were made for an upcoming monitoring workshop to be held at a new UC reserve in Cambria.

Date	Location	Personnel	Comments
November 10	White's Point	Steven Lee, Barbara Hajduczek,	UCLA personnel only No MMS Help
November 11	Point Fermin	S. Lee, B. Hajduczek, Susanne Lawrenz-Miller	UCLA personnel with Cabrillo Marine Aq. help
November 12	Alegria	S. Lee, B. Hajduczek, S. Bergquist, Jay Smith	UCLA personnel only No MMS Help
November 13	Arroyo Hondo	S. Lee, S. Bergquist, B. Hajduczek	UCLA personnel only No MMS Help
November 27	Coal Oil Point	S. Lee, Katherine Anderson	UCLA personnel only No MMS Help
December 9	Old Stairs	S. Lee, S. Bergquist, B. Hajduczek, Brent Mardian	UCLA personnel, plus MMS intern
December 10	Mussel Shoals	S. Lee, S. Bergquist, B. Hajduczek, B. Marian	UCLA personnel, plus MMS intern
December 11	Carpinteria	S. Lee, S. Morton, S. Bergquist, B. Marian	UCLA personnel, SB County, plus MMS intern
December 12	Paradise Cove	S. Lee, B. Hajduczek, S. Bergquist, B. Marian	UCLA personnel, plus MMS intern

Future Plans:

Throughout the present quarter, we will continue with our completion of items relating to the Fall 2000 sampling season, including slide scoring and data management. We will also continue the process of scanning and archiving the current photoplot and photo survey slides for LA, Ventura, and So. Santa Barbara Counties. Discussions are currently underway to explore improvements to the mobile invertebrate protocol, and for the planning and coordination of the upcoming comprehensive surveys that will be made at all of our monitoring sites. Multiple low tide dates have been set aside for these comprehensive surveys to aid the UC Santa Cruz-based task force in planning and logistics. Planning and execution of the Spring 2001 sampling will also occur in the present quarter (Figure 2).

Date	Location	Personnel
March 7	Paradise Cove	TBD
March 8	Carpinteria	“
March 9	Mussel Shoals	“
March 21	Coal Oil Point	“
March 22	White's Point	“
April 3	Old Stairs	“
April 4	Alegria	“
April 5	Arroyo Hondo	“

Problems Encountered:

Uncertainty regarding the precise methods to be employed in the sampling of mobile invertebrates. This uncertainty was not unexpected, since this was the first time the mobile invertebrates were sampled and not all aspects of the sampling protocol had been worked out.

MMS Action Required:

No specific MMS action is required. However, oversight regarding the sites sampled during this year's comprehensive surveys would be useful to ensure that Los Angeles and Ventura County sites are included in the surveys.

A Design for a Time Series Study of a NIMBY Response

Principal Investigator: Eric Smith, Department of Political Science, University of California, Santa Barbara, California 93106

Major Accomplishments, October 1, 2000 - December 31, 2000

In this period, we focused on analysis of a March 1998 data set to help select questions for the questionnaire. The goal of the analysis was to determine whether we should include a battery of questions on trust in experts. In previous studies, many investigators have argued that the trend of declining trust in government and industries has caused people to distrust government and industry experts. Consequently, when experts offer the public assurances that potentially risky environmental technologies are actually safe, the public ignores them. That is, the lack of trust is one cause of exaggerated perceptions of risk. However, in a recent study Howard Margolis argued that the causal direction is actually from risk perception to trust. When people fear a technology, they distrust experts who maintain that the technology is safe. In order to investigate the causal relationship between trust and risk perceptions, we estimated a two-stage, least-squares regression model with trust in government, oil industry, or environmental group experts and support for oil drilling as the endogenous variables. We found that attitudes toward oil drilling causes trust, but trust does not cause attitudes. In the case of trust in government experts, the regression coefficient came close to statistical significance at $p < .05$, but did not attain it.

The results of this investigation are presented in "Trust in Experts: A Cause of Attitudes or a Consequence?" This paper has been submitted to MMS for review prior to submission to a journal.

Problems Encountered: None

MMS Action Required: None

Future Plans: In the next three months, and we will finalize the survey questionnaire and work on the final project report.

Estimated Percentage of Budget Expended:

Project Year 1	91%
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The Political Economy of the Rigs-to-Reef Option for Decommissioning of Offshore Oil and Gas Structures

Principal Investigators: **Michael McGinnis**, Marine Science Institute, University of California, Santa Barbara, California 93106; **Linda Fernandez**, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara, California 93106; **Caroline Pomeroy**, Institute of Marine Science, University of California, Santa Cruz, California 95064

Major Accomplishments, October 1, 2000 - December 31, 2000

Our Draft Final Report was submitted to MMS for comments. We are awaiting feedback, then will finalize the report.

MMS Action Required: We need approval for the transfer of funds into equipment for the partial cost of a replacement computer for Dr. Pomeroy.

Estimated Percentage of Budget Expended:

Project Year 1	95%
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Early Development of Fouling Communities on Offshore Oil Platforms

Principal Investigators: H. Mark Page, Jenifer Dugan, and Jason Bram, Marine Science Institute, University of California, Santa Barbara, California 93106

Major Accomplishments, October 1, 2000 - December 31, 2000

During the reporting period, we continued to measure spatial and temporal patterns in development of the invertebrate community at depths of 6, 12, and 18 m on Platform Houchin. Invertebrates were sampled on two types of settlement surfaces (tiles, tuffys) attached to frames and on conductor pipes. Tiles were retrieved after a 2 or 4-month exposure time at all depths in August. Tuffys were retrieved monthly at all depths. Permanently marked 20 cm x 20 cm quadrats on conductor pipes at Houchin, scraped at intervals of 2, 4, 6, and 12 months, were photographed in July and September. Vacuum samples from these 2, 4, 6, and 12-month treatments were collected at all depths in July and 2-month treatments were collected in September. Removal experiments using the anemone, *Anthopleura elegantissima*, and the mussel, *Mytilus californianus*, were monitored monthly at a depth of 9 m. Faunal litterfall traps, deployed at a depth of 18 m, were monitored monthly at Hogan. Planktonic larval collection and clod card deployment at 6, 12, and 18 m was initiated in July, and continued monthly.

For the tiles and vacuum samples, biomass varied significantly among exposure times and depths. For the 2-month and 4-month exposure periods on the tiles, mean dry biomass increased with exposure time and decreased with depth. For the 2-month, 4-month, 6-month, and 12-month exposure periods on the vacuum samples, mean dry biomass also increased with exposure time and decreased with depth.

On average, 167 g of animal biomass was collected monthly from each faunal litterfall trap, with a high of 212 g in August and a low of 119 g in September. Mussels, (*Mytilus galloprovincialis*) comprised most of the faunal litterfall by weight.

Clod cards, used to determine relative flow between the depths, indicated that the flow at the 6 m depth was significantly greater than the flow at the deeper depths in all months.

Upcoming work:

Deployment and retrieval of settlement surfaces, photography of permanent plots, and vacuum sampling will continue as described above. We will continue to monitor the removal experiment plots. The faunal litterfall from the traps will be collected monthly. Planktonic larval collection and clod card deployment will continue on a monthly basis.

Estimated Percentage of Budget Expended:

Project Year 1	48%
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Application of Genetic Techniques for use Restoration of Surfgrass (Phyllospadix torreyi)

Principal Investigators: **Scott Hodges**, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, California 93106; **Douglas Bush**, Marine Science Institute, University of California, Santa Barbara, California 93106; **Daniel Reed**, Marine Science Institute, University of California, Santa Barbara, California 93106

Major Accomplishments, October 1, 2000 - December 31, 2000

We have been focusing our efforts on our analysis of genetic diversity within and among populations of surfgrass. We have completed AFLP fingerprints, using six different primer pairs, on all of these samples. Currently, we are scoring these gels and have begun some preliminary analyses. We have found about 30 variable bands among samples across populations and therefore we expect to have nearly 200 variable bands to determine population differentiation. Thus far we have found genetic evidence for clonality on a limited scale. Clones appear to occur on a spatial scale on the order of 1-2 meters at most. In addition, we have found a great deal of variation within and among populations of surfgrass. Preliminary analyses based on a subset of our data indicate that populations are genetically differentiated from one another on the spatial scale of about 50 km. We have also begun to analyze our samples to determine the mating system of surfgrass. We have analyzed one population to date and found that all seeds were produced through sexual reproduction and not apomixis.

We have also been conducting genetic analyses to identify molecular markers for gender. So far we have screened approximately 70 Randomly Amplified Polymorphic DNA (RAPD) primers for sets of males and females. From these analyses we have identified one possible marker for gender. This marker has only been found in males thus far and never in females. However, not all males possess this marker making it of limited value for our purposes. We plan to determine if these patterns occur in larger samples and if so, we will then try several techniques to convert this marker into a consistent marker for gender.

Future plans:

We are working on a manuscript and the final report.

Estimated Percentage of Budget Expended:

Project Year 1	100%
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