

**SOUTHERN CALIFORNIA EDUCATIONAL INITIATIVE  
PROGRAM YEAR 12  
QUARTERLY REPORT 1**

*for the period*

*July 1, 2000 – September 30, 2000*



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

*October 18, 2000*

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**Russell J. Schmitt**  
Program Manager

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

*October 18, 2000*

## **Program Manager's Report**

*for the period July 1, 2000 – September 30, 2000*

This constitutes the quarterly report for the first 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 Draft Final Report for project, *The Political Economy of the Rigs-to-Reef Option for Decommissioning of Offshore Oil and Gas Structures*, McGinnis, Fernandez and Pomeroy, Pls will be submitted to MMS next quarter.

*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, July 1, 2000 - September 30, 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 are linking these developmental predictors of response to our functional observations of the multi xenobiotic response (MXR) in these embryos. We had recently developed a new method of measuring MXR dependent dye efflux in batches of whole larvae using the fluorescent probe calcein-AM. This probe has the advantage of being trapped inside larvae once the lipid soluble AM group is cleaved by intracellular esterases. This results in maintenance of a high inwardly driven gradient of calcein-AM even at very low extracellular concentrations.

To confirm that the dye efflux results observed in urchins and *Urechis* are not due to species specific differences in membrane permeability to dye we modified a dye efflux assay using calcein-AM (acetoxymethyl ester). Urchin and urchin embryos were incubated for three hours with 0.5µm Calcein-AM either in the presence or absence of BWSF. The AM form of calcein is membrane permeable, while the free form is not. Moreover only the free form is fluorescent. Because the AM group is rapidly cleaved off by intracellular esterases the assay measures only the fluorescence of calcein trapped within the cells.

The results confirmed our previous findings using the dye rhodamine. However the calcein AM assay did prove to be more consistent than the rhodamine assay. Urchins incubated in the presence or absence of BWSF accumulated high levels of free calcein as indicated by bulk fluorimetry (~200 counts/second/embryo). In contrast, urchin embryos accumulated significantly less free calcein in the absence of BWSF (~100 counts/second/embryo), but when incubated in the presence of BWSF accumulated nearly the same level of free calcein as in urchin embryos. The effects of BWSF in urchin were similar to those observed in embryos incubated in the presence of known inhibitors of MXR such as verapamil.

**Future Plans:**

We are modifying an initial version of a manuscript on the work described above. In addition, we are conducting final exposures of adult starfish for quantitation of MXR protein in coelomocytes.

**Estimated Percentage of Budget Expended:**

Project Year 1	100%
Project Year 2	100%
Project Year 3	96%

*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, July 1, 2000 - September 30, 2000**

- Processing of bivalve and crustacean samples for size-frequency analysis continued in Carr's lab at UCSC with the image analysis system. A senior thesis, being conducted in his lab should be completed later this academic year. It is entitled, "Effects of cessation of a produced water discharge on the size frequency of a bivalve, *Telina carpenterii*, off Carpinteria, California".
- Osenberg's lab continued their efforts to proof data files and to format the files for data analysis. The task proved much more complex than first anticipated, and the errors in the original files were more numerous than we expected. We had previously proofed and corrected all of the Gaviota and Carpinteria files for the biocores, emergence traps, and re-entry traps. This quarter, we completed revising the file listing the taxonomic status (phylum, order, class, family, genus, species) for each of the ~1500 taxa found in the MRC, Gaviota, and Carpinteria datasets. Files were cross-validated using SCAMIT's taxonomic list; ~99% of the taxa were resolved completely.
- We continued to seek other applications of the BACIPS design and to promote more sound scientific assessment of human effects in coastal habitats. For example, we now have a paper accepted, pending revision, that extends the BACIPS design to the "attraction-production" controversy that underlies the rigs-to-reef debate (*Osenberg, C.W., C.M. St. Mary, J.A. Wilson, and W.J. Lindberg. A quantitative framework to evaluate the attraction-production controversy, with application to marine ornamental fisheries. ICES Journal of Marine Science*). We also received funding from the National Sea Grant program to apply this approach to marine ornamental fisheries.

**Future plans:**

- The senior thesis in Carr's lab will likely be completed by the end of the year.
- We are also making arrangements to have all samples not designated for size frequency analysis to be archived at the Los Angeles County Museum.
- We do not expect to make significant progress on data analyses during Fall term, 2000, due to other obligations. We expect Osenberg to conduct data analyses during Spring and Summer 2001. At that time he also will fully document and archive these files for storage (on CD). As indicated in the 2000 Annual Report, we expect the project to take until *at least the end of summer 2001* to complete.

**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 the end of 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, July 1, 2000 - September 30, 2000**

The barnacle casts that were put in the intertidal (Pt. Sierra Nevada, Shell Beach and Boathouse) in March, have been checked monthly for the presence of tar (Fig.1). To date, at Point Sierra Nevada tar was found on 20% of the casts in the Barnacle and *Endocladia* zones, while only 7% of the casts in the *Pelvetia* zone had tar. At Shell Beach and Boathouse tar accumulated primarily in the barnacle zone, with 27% and 47% respectively (Fig. 1). Additionally, at Shell Beach tar was found on 7% of the casts in both the *Endocladia* and *Pelvetia* zones. At Boathouse tar was present on 7% of the casts in the *Endocladia* zone and on 27% percent of the casts in the *Pelvetia* zone. In contrast to the other sites, 5% of the casts in the *Mytilus* zone at Boathouse had tar in June, but when they were sampled again in July the tar was not present. Since then, no tar has been found in the *Mytilus* zone at any of the sites. Thus, it appears that (with the exception of the mussel zone) once tar accumulates it persists. Thus far, we have been recording the presence or absence of tar on the casts. So far all of the casts (which have accumulated tar), have similar size patches and most have only one patch per cast.

Shell Beach is a site that we may abandon due to human interference. It appears that the casts are being stolen (up to 8 in one zone during a one month period). Shell Beach is the only site with public access and it is the only site that we've lost any casts. Because of this problem, it will be hard to analyze the data, since we are unable to determine whether or not the missing plates had tar when they were removed. It is possible that more tar has accumulated than what we are reporting. This problem has continued to worsen through the summer. Additionally, it is not cost effective to continually manufacture and replace the missing casts.

### **Future Plans:**

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### **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.

### **Estimated Percentage of Budget Expended:**

Project Year 1    40%

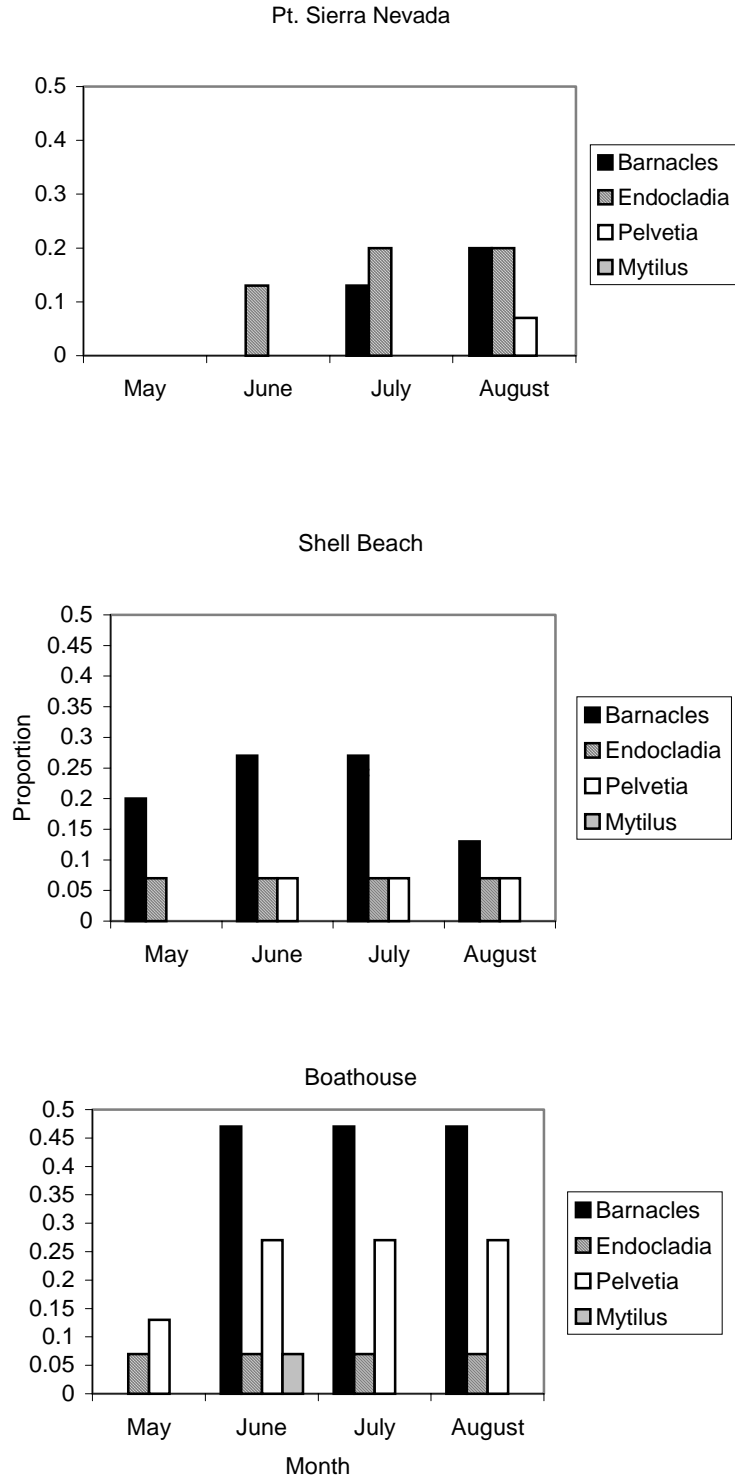


Figure 1. The proportion of barnacle casts in 4 zones that have accumulated tar during May, June July, August and September 2000. Note that the scales are different along the y-axes.

*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**

The majority of the work for the Shoreline Inventory Project in San Luis Obispo (SLO) and Northern Santa Barbara (NSB) Counties during this quarter focused on scoring photographic slides and entering these percent cover data, along with field data collected during the previous quarter into computer files. Although no statistical analyses were performed, these data have been incorporated into graphs that allow us to observe dynamics in species abundances. Comprehensive statistical analyses are done every 3 years and results are discussed and included in a formal 3-year report to the Minerals Management Service.

On July 1<sup>st</sup> & 2<sup>nd</sup>, and 5<sup>th</sup>-7<sup>th</sup>, SLO and NSB sites were visited in order to collect data for an ongoing barnacle recruitment study.

Currently, we are planning and preparing for the upcoming sampling trips, which will take place in October and November.

**Future Plans:**

In the next quarter we will sample all sites in both counties.

**Problems encountered:**

None

**MMS Action Required:**

None

**Estimated Percentage of Budget Expended:**

Project Year 1 98%



*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, July 1, 2000 - September 30, 2000**

During this quarter, effort was divided between completing tasks relating to the Spring 2000 sampling, miscellaneous tasks relating to the project as a whole, and the planning of the Fall 2000 sampling. Between an extended Jury Service and vacation time, the technician Steven Lee was absent throughout most of the month of September. Therefore, the work described here reflects that done during the first two months of the quarter. During the first part of the quarter, a considerable amount of time was spent wrapping up the 1999 annual report. In mid July to early August, all of the relevant sites were visited during low tide events for the Summer 2000 barnacle data collection (see attached Table 1). After the sampling, the retrieved plates and the data sheets were sent

**Table 1. Barnacle sampling schedule for Summer 2000**

<b>Date</b>	<b>Location</b>	<b>Comments</b>
July 19	Paradise Cove	UCLA Group
July 19	Old Stairs	UCLA
July 20	Alegria	UCLA/MMS Intern
July 20	Arroyo Hondo	UCLA
July 20	Carpinteria	UCLA – Tide too high at Carp
July 21	Carpinteria	UCLA
July 21	Mussel Shoals	UCLA
August 4	White's Point	UCLA

to the Raimondi group at UC Santa Cruz for further analysis and data management. In late July and early August, a synthesis of our observations following the April 2000 gasoline spill at Mussel Shoals was compiled. This report was sent to Ken Wilson at the California Department of Fish and Game to be included in his analysis of the impacts of the spill on the intertidal community at the site. In mid-August, Steve joined Jack Engle and Dan Richards on a Channel Islands Research Program (CIRP) cruise to visit study sites on Santa Barbara and San Clemente Islands. The remainder of August was spent working on various project-related tasks, and on preparations for the upcoming Fall 2000 sampling season (see Table 2). Images from the Spring 2000 sampling were scanned into the computer for archiving, data and images from the two Santa Catalina Island sites were processed, and a list of needed items was researched, compiled and delivered to MMS for consideration.

**Table 2. Proposed sampling schedule for Fall 2000**

<b>Date</b>	<b>Location</b>	<b>Comments</b>
November 10	White's Point	UCLA Group
November 11	Point Fermin	UCLA/Cabrillo Marine Help
November 12	Alegria	UCLA/SB County Help
November 13	Arroyo Hondo	UCLA/SB County Help
November 27	Coal Oil Point	UCLA/SB County Help
December 9	Old Stairs	UCLA/MMS Help
December 10	Mussel Shoals	UCLA/MMS Help

**Future Plans:**

Throughout the present quarter, we will continue with our preparations for the Fall, 2000 sampling season. 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. We are in the process of planning the future sampling of motile invertebrates within our established plots. We plan to implement these changes during the upcoming sampling season. There is still some discussion about repeating the one time survey protocols again at all the sites, and we are still in the planning stages as to how and when this new sampling will occur.

**Problems Encountered:**

None.

**MMS Action Required:**

We are still communicating with MMS to determine an appropriate list of items that might be purchased for our group, and we are awaiting the arrival of the items that have already been ordered.

## *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, July 1, 2000 - September 30, 2000**

In this period, we continued to analyze the data from a March 1998 public opinion survey to test a model of how people form opinions toward potentially risky environmental technologies such as offshore oil drilling and nuclear power. The central model in this work combines the insights of Mary Douglas and Aaron Wildavsky's cultural theory and John Zaller's Receive-Accept-Sample model of public opinion formation. Refining the model is critical to designing the questionnaire for the time series study.

The paper we presented at the World Association of Public Opinion Research conference in May, "The Role of Knowledge in Attitudes toward Risky Environmental Technologies," was revised and submitted to a journal for publication. We have not yet received a response.

Based on the analysis of the March 1998 survey data, we have continued to refine the survey instrument. One focus of research has been on the role of trust. Loss of trust in institutions and the experts associated with them is one of the most commonly proposed explanations for the failure of people to believe expert risk assessments and accept technologies such as offshore oil drilling. The argument is that if people do not trust the government, big business, university scientists, or other sources of expertise, then they will reject the experts' assurances that risks are minimal and that they have no reason to worry. Some scholars further claim that trust in experts has declined in the last forty years and that the U.S. is becoming a less trusting society. The lack of trust, according to this reasoning, explains why many Americans remain afraid of nuclear power plants, high-power electric transmission lines, offshore oil drilling, and other potential risks.

In a recent book, Howard Margolis raised doubts about the role of trust and distrust in risk assessments. Margolis suggested that the causal path may actually be in the opposite direction. Once a person has decided that something is dangerous, he or she will distrust any so-called expert who says otherwise. That is, distrust may be *caused by* exaggerated fears, rather than being a cause of them. Margolis produced no direct evidence to support his claim; nevertheless, his argument is certainly plausible.

We began examining the relationship between trust in experts and attitudes toward offshore oil drilling using our survey data and two-stage, least squares regression methods. Our initial findings suggest that attitudes toward oil drilling cause trust in government, oil industry, and environmental group experts—as Margolis predicted. Trust in government experts however, may have some effect on attitudes. If these findings hold up, they will suggest that the trust questions about advocacy groups be revised or dropped from the questionnaire being designed.

Finally, we worked on the zip-code based coding scheme to measure the proximity of potential survey respondents in the San Luis Obispo, Santa Barbara, and Ventura counties to oil drilling or refining facilities, and a similar measure of whether oil drilling or refining facilities are in the viewshed of potential respondents. This coding scheme will be designed to work in geographical information systems (GIS) software. This work progressed slowly because of the complications in GIS software.

**Problems Encountered:** The work on comparative risk assessment information in newspapers has been stalled because of the departure of the graduate student research assistant who had been collecting those data. This problem should be resolved by the fall quarter.

**MMS Action Required:** None

**Future Plans:** In the next three months, we expect to complete the paper presenting our findings about available comparative risk assessment information in newspapers. We also hope to prepare a paper presenting our findings on the role of trust in experts and submit it to MMS for review.

**Estimated Percentage of Budget Expended:**

Project Year 1	88%
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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, July 1, 2000 - September 30, 2000**

The Draft Final Report for this project is almost complete. It will be submitted to MMS for comments next quarter.

**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, July 1, 2000 - September 30, 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	100%
Project Year 2	10%

*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, July 1, 2000 - September 30, 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:**

Work will proceed as proposed.

**Estimated Percentage of Budget Expended:**

Project Year 1	97%
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