

GRANT AGREEMENT
between the
U.S. FISH AND WILDLIFE SERVICE
and
UNIVERSITY OF CALIFORNIA, SANTA CRUZ
for
MUSSEL BED RESTORATION

FISH AND WILDLIFE
SERVICE

FEB 03 2009

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VENTURA, CA

FWS Agreement No.: 814409G300

Charge Code: 81440-9822-0167
Amount Obligated: \$104,999
Recipient Tax Identification No. 94-1539563
CFDA No. (If applicable) 15.FFB
Recipient DUNS#: 125084723
Expiration Date: December 2013

I. TYPE OF AGREEMENT:

☒ Grant
☐ Cooperative Agreement
☐ Fire Agreement

II. TYPE OF ORGANIZATION:

☐ State, Local or Indian Gov.
☐ Non-Profit Organization
☒ Higher Education Inst.
☐ Private Individual
☐ Business Organization

III. PARTICIPANTS:

Funding Organization:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

Recipient Organization:

University of California, Santa Cruz
c/o Wanda J Moody; Ocean Science
1156 High Street
Santa Cruz, CA 95064

IV. PROJECT OFFICERS:

FWS Officer:

Name: Denise Steurer
Phone: (805) 644-1766 ext. 339
Email: denise_steurer@fws.gov

Recipient:

Name: Peter Raimondi
Phone: (831) 459-5674
Email: Raimondi@biology.ucsc.edu

Grant Agreement No. 814409G300

V. PURPOSE/OBJECTIVE:

The purpose of this Agreement, dated December 2008, is to serve as the legal instrument to provide the University of California, Santa Cruz (UCSC) with monies paid on a reimbursable basis from the Torch/ Platform Irene oil spill settlement fund (\$104,999) of the U.S. Fish and Wildlife Service (Service). The purpose of the funded restoration project is to restore mussel beds adjacent to areas that were impacted by the Torch/ Platform Irene oil spill and explore the success of various restoration methods. As the spill impacted rocky intertidal habitats, including mussel beds, this project will seek to speed up the natural restoration process of these impacted mussel beds by seeding barren areas with adult mussels, and documenting the success of transplant methods.

This project is funded from the settlement of claims for natural resource damages resulting from a discharge of crude oil following a rupture in an offshore pipeline emanating from Platform Irene, off the Santa Barbara County coast near Vandenberg Air Force Base. Settlement funds are administered by a Trustee Council which includes trustee representatives from the U.S. Department of the Interior (represented by the Service), the California Department of Fish and Game, the U.S. Department of Air Force-Vandenberg Air Force Base and the California State Lands Commission. The Trustees completed the Final Restoration Plan and Environmental Assessment for the Torch/ Platform Irene Oil Spill (Restoration Plan) to guide the use of the settlement funds to implement projects designed to restore, rehabilitate, replace or acquire the equivalent of the injured natural resources.

VI. AUTHORITY:

The restoration implementation is being conducted under the authority of the federal Oil Pollution Act of 1990 (OPA) (33 U.S.C. 2701 et seq.) and the California Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (Government Code 8670.1 et seq.). Restoration activities must comply with all applicable laws and regulations including the federal and state Endangered Species Act, the federal Clean Water Act, the federal Migratory Bird Treaty Act, the National Environmental Policy Act, the National Historic Preservation Act, and the California Environmental Quality Act. The intent of the statutory authority is to restore the equivalent of the injured natural resources from the oil spill. The UCSC was selected as the grant recipient based on its experience in studying mussel beds in northern and central California for many years.

VII. FUNDING INFORMATION:

Funding from the Service will be provided on a reimbursable basis and paid as a direct deposit via electronic funds transfer into the UCSC account. The Service will provide up to \$104,999 to be reimbursed to UCSC as the work progresses and upon presentation to the Service of itemized bills, receipts, and/or documentation of other expenses. Nothing herein shall be considered as obligating the Service to expend funds or otherwise obligate the Service for the future payment of money in excess of appropriations authorized by law and administratively allocated for the activities associated with this Agreement. See the attached budget under Related Attachments in

Exhibit A. Expenses incurred prior to the effective date shall be reimbursed if activities performed were in accordance with the terms of the Agreement.

VIII. TERM OF AGREEMENT:

This Agreement will become effective upon the date of the last signature and will expire five years from the date of the last signature.

IX. SPECIFIC OBLIGATIONS OF EACH PARTY:

A. The University of California, Santa Cruz will:

1. Work cooperatively with the Service, Minerals Management Service, and other parties to conduct the Mussel Bed Restoration project, and implement this Agreement for the mutual benefit of UCSC and the Service;
2. Ensure that the funds provided by and activities conducted pursuant to this Agreement are not to replace, supplement or otherwise contribute to any mitigation or compensation that may be required of UCSC or other parties;
3. Inform the public, when needed, of the general purpose of the project and represent appropriately to all interested parties, public and private, that the purpose and accomplishments of the project represent a collaborative partnership among the Service, UCSC, and other parties involved;
4. Furnish the necessary personnel, materials, and services, and do all things required to accomplish the project;
5. Provide substantive written progress reports to the Service, as specified in the Reporting Requirements section of this Agreement;
6. Any future deviations from the procedures or objectives specified in the recipient's proposal must be presented to and approved by the Service for specific approval before implementation (see Section on Modifications).

B. The Service Shall:

1. Work cooperatively with UCSC to provide project guidance for activities conducted pursuant to this Agreement;
2. Provide funds to UCSC on a reimbursable basis in an amount not to exceed \$104,999 in the manner put forth in the section of this Agreement entitled "Funding Information";
3. Provide technical assistance to UCSC in accordance with this Agreement and for compliance with the federal Endangered Species Act. If compliance with other federal,

state or local regulations is necessary, the Service will provide technical assistance but not act as applicant or agent for procuring any other federal, state or local permits or authorizations as applicable to the project;

4. Incorporate the UCSC proposal and budget provided in Exhibit A as an integral part of this project.

X. REPORTING REQUIREMENTS:

UCSC will provide to the Service project officer quarterly progress reports with an explanation of activities and accomplishments in order to document project progress. A draft final report will be provided to the Service for review and a final report to accompany the final invoice for project expenditures upon project completion. The final report will include the project title, grant agreement number, date of the report, period of time covered by the report, a description of the methods and materials, a comparison of actual accomplishments with the established goals and objectives, relevant photographs, any special problems encountered and mutually agreed upon modifications, and a summary of expenditures, consistent with the project budget in Exhibit A of this Agreement. All reports shall be submitted to the Service project officer at the address contained in this Agreement.

UCSC shall immediately notify the Service project officer of developments that have a significant impact on activities covered by this Agreement.

XI. INVOICING/ACCEPTANCE PROCEDURES:

The Service will reimburse invoices for project expenses no more frequently than monthly and as the work progresses. UCSC will document materials or services contributed to the project, including in-kind matches, as outlined in the project budget in Exhibit A. Ten percent of the total amount of the Agreement should be withheld until all requirements of the Agreement are accomplished. A final invoice may be submitted for the 10% withheld once all the requirements are approved.

All recipients not currently receiving funds electronically from the Department of the Interior or Fish and Wildlife Service are responsible for completing a Standard Form 3881 (ACH) and forwarding it to the Service project officer.

Should the recipient be unable to complete the provisions of this Agreement, all monies provided by the Service which prove to be cancelable obligations or unallowable in accordance with applicable administrative and cost principle regulations (as referenced in the "Applicable Regulations" section of this Agreement) or the approved budget, shall be refunded to the Service.

This Agreement is intended to support a particular project for a specified period of time. Any portion of funds not expended by the expiration date of this Agreement shall be returned to the Service, including any interest earned on that amount (subject to provisions of applicable OMB

Circular or 43 CFR Part 12 Subpart, as referenced in "Applicable Regulations" section of this Agreement).

XII. APPLICABLE REGULATIONS:

A. The recipient must submit with this Agreement Standard Form 424B – Assurances Non-Construction. In addition to the assurances listed on the Standard Form, the recipient certifies compliance with the following regulations, as applicable, incorporated by reference with the same force and effect as if they were provided in full text. Failure of a recipient to comply with any provision may be the basis for withholding payments for proper charges made by the recipient and for termination of support.

1. OMB Circular A-102, Grants and Cooperative Agreements with State and Local Governments as codified at 43 CFR Part 12, Subpart C
2. OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations as codified at 43 CFR Part 12, Subpart F
3. OMB Circular A-21, Cost Principles for Educational Institutions
4. OMB Circular A-87, Cost Principles for State, Local, and Indian Tribal Governments
5. OMB Circular A-122, Cost Principles for Non-Profit Organizations
6. OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations
7. 43 CFR Part 12, Subpart D - Government-wide Debarment and Suspension (Non-procurement) and Government-wide Requirements for Drug Free Workplace
8. 43 CFR Part 12, Subpart E - Buy American Requirements for Assistance Programs
9. 43 CFR Part 18 - New Restrictions on Lobbying
10. 48 CFR Part 31.2 - Contracts with Commercial Organizations
11. 48 CFR Part 52.215.2 - Audit and Records - Negotiation

Copies of the above documents are available at the following websites:

<http://www.whitehouse.gov/OMB/circulars/index.html> or www.doi.gov/pam/pamfaeg.html

B. Small Business Policy

Reference 505 DM 3.5 C(1)(a):

It is a National policy to award a fair share of contracts to small and minority business firms. The Department of the Interior is strongly committed to the objectives of this policy and encourages all recipients of its grants and cooperative agreements to take affirmative steps to ensure such fairness.

1. The grantee and sub-grantee shall take all necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used when possible.

2. Affirmative steps shall include:

(i) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(ii) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(iii) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business, and women's business enterprises;

(iv) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women's business enterprises;

(v) Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce as appropriate, and;

(vi) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in (2)(i) through (v) above.

XIII. TERMINATION:

This Agreement may be terminated by any party following 30 days written notification to other party(s).

XIV. MODIFICATION PROCEDURES:

Modifications to this Agreement may be proposed by either party and shall become effective upon written concurrence of all parties. Work completed prior to written concurrence of all parties is done at the recipient's risk, without expectation of reimbursement.

XV. SPECIAL PROVISIONS:

Seat Belt Policies and Programs: Recipients of grants/cooperative agreements and/or sub-awards are encouraged to adopt and enforce on-the-job seat belt use policies and programs for

their employees when operating company-owned, rented, or personally-owned vehicles. These measures include, but are not limited to, conducting education, awareness, and other appropriate programs for their employees about the importance of wearing seat belts and the consequences of not wearing them.

Greening Policies and Programs: In accordance with Executive Order 13101 "Greening the Government Through Waste Prevention, Recycling and Federal Acquisition," recipients of grants/cooperative agreements and/or sub-awards are encouraged to actively and systematically protect the natural processes that sustain life whenever possible, by incorporating environmentally preferable products in their activities. These measures include, but are not limited to, re-refined oil for all vehicles and heavy equipment and diverting solid waste from disposal in landfills through recycling and use of materials that reduce greenhouse gas emissions.

XVI. RELATED ATTACHMENTS:

Exhibit A UCSC Mussel Bed Restoration Project Proposal and Budget

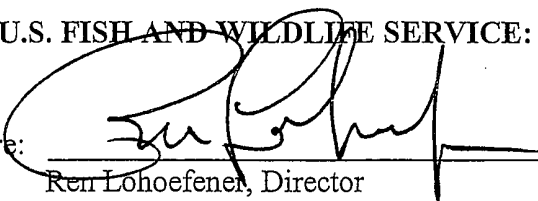
FISH AND WILDLIFE
SERVICE

FEB 23 2009

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FOR THE U.S. FISH AND WILDLIFE SERVICE:

Signature: _____

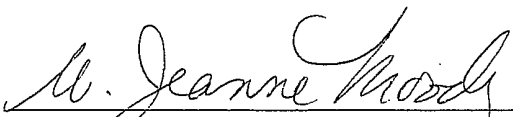

Ren Lohofener, Director
Region 8

Date: _____

1/26/2009

FOR THE RECIPIENT:

Signature: _____

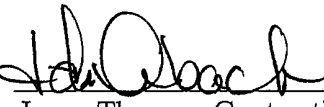
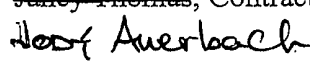

W. Jeanne Moody, Contract and Grants Officer
University of California, Santa Cruz

Date: _____

2/18/09

FWS CONTRACT SUFFICIENCY REVIEW:

Signature: _____


~~Janey Thomas~~, Contracting Officer

P. 572

Date: _____

1/14/09

Exhibit A UCSC Mussel Bed Restoration Project Proposal and Budget

Title: Mussel bed restoration

Funding Agency:	Denise Steurer U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office 2493 Portola Road, Suite B Ventura, CA 93003 Denise_Steurer@fws.gov (805) 644-1766 x 339
Principal Investigator	Peter Raimondi Professor, Department of Ecology and Evolutionary Biology University of California Center for Ocean Health, Long Marine Lab 100 Shaffer Road Santa Cruz CA 95060 831-459-5674 831-459-3383 (FAX) raimondi@biology.ucsc.edu
Amount	\$104,999
Period	11/01/2008 – 10/31/2013

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Mussel Bed Restoration

Background, Goals and Nexus to Injury

Mussel beds in northern Santa Barbara County and elsewhere in southern California have been declining for the past several years. The value of mussel beds in the coastal region is well documented. Mussel beds are one of the most diverse habitats in the world, and are relied upon by many marine animals as an important food source. When damaged, they may take as long as 15 - 20 years to recover fully. Many organisms depend on this stable habitat for their livelihood, including the diverse assemblage found within the mussel bed itself. Other animals such as birds, seastars, and sea otters also rely on mussels as an important food source. As the 1997 Torch Platform Irene oil spill (Spill) impacted rocky intertidal habitats, including mussel beds, this project will seek to speed up the natural recovery process of these impacted mussel beds by seeding barren areas with adult mussels.

Oil covered rocky intertidal habitats, including mussel beds, were observed along the shoreline during the Spill at a location south of Point Arguello. While levels of injury greater than 10 percent were not documented, it is expected that the oil exposure caused unquantifiable, low levels of injury to a variety of rocky intertidal species including crustacea, mollusks, arthropods, and algae. Seastars, in particular, and other rocky intertidal plants and animals found in mussel beds were injured by the Spill. Oiled seastars were documented in photos taken at Point Arguello near the CDFG's abalone plots. As seastars are long-lived animals, and a keystone species, the loss of even a small percentage of adults will be felt in the population for many years. Since mussels are the primary food of seastars, maintaining a stable source of mussel provides direct benefits to seastars. Mussel beds also provide an important habitat for many other important intertidal species including barnacles, limpets, worms, snails, and varieties of algae. Restoring mussel beds to a healthy condition also provides collateral benefits to marine vertebrates such as sea otters and shorebirds which feed on mussels.

Project Description and Methods

UC Santa Cruz (Raimondi Lab) will implement this project due to its experience in studying mussel beds in northern and central California for a number of years. Indications from previous studies are that once a threshold of cover is reached in a plot, recovery rates increase. The goal of this restoration would be to accelerate the normal recovery time by starting with a 30% cover of mussels of the species *Mytilus californianus*, thereby shortening the recovery time. Assessment will occur at up to three separate sites on VAFB that have mussel beds – these are likely to be south of Surf Beach on the southern side of Point Arguello, north of Wall Beach, and at Purisima Point. While We expect to do the study at three sites, however if unforeseen logistical constraints occur (eg collection issues) those issues would have to be accommodated. At each site up to 8 study plots and 8 control plots will be established, each 1 meter square.

Each of the experimental plots will be “seeded” by laying small patches of adult mussels on the substrate. Vexar mesh will be affixed over the mussels and to the substrate to facilitate mussel attachment. This protocol has been used successfully for mussel transplantation for 6 years by our lab group. What is uncertain is the degree to which these transplants act to induce

subsequent settlement. The control plots at each site will be established along with the experimental plots in gaps in the in mussel beds. The total cover of added mussels in each plot will be around 30%. The vexar will be removed in approximately 1 month at which time the mussels would have been able to put out sufficient byssal threads to stay secured to the substrate (this is based on PISCO data). Instead of taking mussels from otherwise healthy beds, adult mussels will be collected using hand removal from an offshore platform after coordination with Minerals Management Service.

In addition to the mussel treatment another treatment (surface treatment) will be used to determine if rate of recovery could be further enhanced through a manipulation of the surface. Previous fieldwork indicated that the presence of some plants and animals are beneficial to mussel recruitment. However, it is not clear whether their presence accelerates the recovery in a plot where adult mussels are being added, or whether the presence of these other plants and animals increases competition for space.

In both surface treatments, undesirable plants (such as fleshy algae) and animals (such as anemones) will be removed to provide a clean substrate for the mussels to attach. In half the plots artificial substrate such as vexar or burlap (thought to mimic properties of coralline algae and byssal thread) would be added to cleared surfaces to enhance recruitment. The full design is presented schematically below.

Treatment	Artificial attachment surfaces	No artificial attachment surfaces
Mussel addition	Up to 4 replicate plots	Up to 4 replicate plots
Control	Up to 4 replicate plots	Up to 4 replicate plots

We have ongoing mussel studies at a number of sites along the central coast. We plan to use the data from these studies to determine the number of plots required using a derivative of a power analysis. In addition, with any transplant study there can be logistic constraints in the field. All sites will be set up at the same time – likely in the fall or winter, during good low tide series. Monitoring of the transplanted mussels will occur every 2 weeks at first (during low tides) then monthly through the first 6 months. After six months monitoring will occur on a quarterly basis through two years. Sampling will occur quarterly and will consist of photographs of the plot and in the field sampling for recruitment.

This design was based on the wealth of knowledge that exists concerning recruitment of mussels. Here we are proposing to determine if addition of “seed” mussels enhances natural recruitment to substrates known to induce recruitment (eg erect corallines, Endocladia etc) or to surfaces mimicking such substrates (eg vexar or burlap). In all treatments we will be removing those species known to inhibit natural mussel recruitment.

We will follow PISCO-UCSC protocols in sampling

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- 1) photos of each plot – these will be used for archival reasons and also to follow movement of transplanted mussels
- 2) assessment of percent cover of all species in plots using
 - a. counts for mobile organisms
 - b. percent cover for sessile organisms – using a point intercept method
- 3) size structure of mussels

Timetable (x = projected, ? = if needed)

Year		2009				2010				2011				2012				2103		
Quarter	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Task																				
Set up sites	x	x																		
Sample sites		x	x	x	x	x	x	x	x	x	?	?	?	?	?	?	?	?	?	?
Final report																				x

As noted above, the expected endpoint of this project will be in the 1st quarter of 2011, but this could be extended based on the recruitment dynamics of mussels

Importance of results

Restoring mussel beds could provide wide-ranging benefits to a variety of individual species including barnacles, limpets, worms, snails, and varieties of algae. More importantly, the project will contribute to an understanding of the efficacy of transplantation through a consideration of the cost, rate and likelihood of recovery through transplantation.

Probability of Success

Based on previous studies, the probability of success of this project is high. The more important result will be the estimation of the cost per unit area of restoration, which could be used to guide other mitigation and / or restoration projects.

Deliverables

- 1) Quarterly reports indicating:
 - a. Progress toward goals
 - b. Impediments, if any
 - c. Approximate costs
- 2) Final report
- 3) Datasets

Collaborators

The primary collaborators will be Mary Elaine Helix of MMS and PISCO investigators,

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including Mark Carr and Carol Blanchette.

Budget

The budget for this project is \$104,999 over 5 years, although the funding is expected to be used over the first 2.5 years. This budget takes into account costs for project administration, necessary supplies and equipment, and the cost of obtaining the mussels. Labor costs associated with setup, transplants, and monitoring, data reduction, analysis, and reporting, along with related travel and per diem costs, are also included in this budget. A detailed project budget is shown below.

University of California Santa Cruz
Office of Sponsored Projects
Detailed Agency Budget

Title Mussel Bed Restoration				Budget Prepared Date 7/24/2008			
				Preparer W Jeanne Moody			
				SC# 20090098			
PI Name Raimondi, Peter		Agency USD/Fish & Wildlife Service					
Start Date 11/1/2008		End Date 11/1/2013					
Salaries:							
Title/Name	SalaryType/Level	Year 1	Year 2	Year 3	Year 4	Year 5	Total
PI	PROFFULL VI	6,639	6,638	0	0	0	13,477
PETE RAIMONDI	Months/Time%	0.5 100%	0.5 100%				
Lab Assist	SPECJR I	17,952	20,060	3,444	0	0	41,456
Laura Anderson	Months/Time%	12.0 50%	12.0 50%	2.0 50%			
Undergrads	USA II	1,750	1,750	0	0	0	3,500
To be selected	Months/Time%	3.5 25%	3.5 25%				
Salaries:		26,341	28,648	3,444	0	0	58,433
Fringe:							
Title/Name	SalaryType/Fringe Rate						
PI	PROFFULL VI	896	923	0	0	0	1,819
PETE RAIMONDI	13.5%						
Lab Assist	SPECJR I	5,206	5,817	999	0	0	12,022
Laura Anderson	29.0%						
Undergrads	USA II	44	44	0	0	0	88
To be selected	2.5%						
Fringe:		6,146	6,784	999	0	0	13,929
Salaries & Fringe:		32,487	35,432	4,443	0	0	72,362
Domestic:							
Name	Destination						
domestic		6,000	6,000	1,000	0	0	13,000
Domestic:		6,000	6,000	1,000	0	0	13,000
Total Travel:		6,000	6,000	1,000	0	0	13,000
Other Direct Costs:							
Type	Description						
Material & Supplies		2,000	2,000	0	0	0	4,000

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Printed on 9/23/2008

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Office of Sponsored Projects
Detailed Agency Budget

	Other Direct Costs:	2,000	2,000	0	0	0	4,000
Fees:	Non-resident Tuition:						
	Graduate Student Health Insurance Program:						
	Graduate Student Registration Fees:						
	Graduate Fee Override:						
	Total Graduate Fees:						
	Total Other Direct Costs:	2,000	2,000	0	0	0	4,000
Totals:	Total Direct Costs:	40,487	43,431	5,443	0	0	89,361
	Indirect Cost Base:	40,487	43,431	5,443	0	0	89,361
	Indirect Cost Base Override:		43,432	5,442			
	IC Rate:	17.5%	17.5%	17.5%	17.8%	17.8%	
	Total Indirect Costs:	7,085	7,601	952	0	0	15,638
TOTAL BUDGET:		47,572	51,032	6,395	0	0	104,999

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