http://www.csuci.edu/ira/index.htm

Application
Instructionally Related Activities Funds Request
2012-2013 Academic Year
DEADLINE: Fall and Academic Year 3/31/12
Spring 2013 deadline is 10/31/12

Applications must first be sent to the appropriate program chair. Chairs will then recommend and route them to the Dean's Office for review and authorization. The Dean's Office will then forward them to the IRA Committee for consideration.

Activity Title: Habitat Choice in Hawaii's Humpback whales
An interdisciplinary field based research and service learning opportunity.

Project Sponsor/Staff (Name/Phone): Rachel Cartwright 805 437 2635
Blake Gillespie 805 437 2404

Activity/Event Date(s): University based activities – Fall 2012 semester.
Hawaii field trip – March 16th – 23rd 2012
Date Funding Needed By: Fall 2012
***Please Note that for Fall Requests the earliest that you will be notified of funding availability will be early June 2012 and for Spring Requests early January 2013.*

Please check if any of the following apply to your IRA:

X Equipment Purchase
□ Event
□ IT Requirements
□ International Travel
□ Space/OPC Requirements
□ Infrastructure/Remodel
□ Other _____

X Field Trip
□ Participant data collection for public dissemination, i.e. interviews/surveys that result is a journal/poster session/newsletter
□ Risk Management Consultation
□ Late Submission

Previously Funded: XYES □NO Yes, Request #4 – previous trips ran in 2009, 2010, 2011
*If previously funded, please attach copy of IRA Report

Does your proposal require IRB (Institutional Review Board) approval: No

Assessment submitted for previously Funded Activity: YES

Academic Program or Center Name and Budget Code: Biology / Chemistry

Date of Submission: March 2012

Amount Requested: **26,760**
(Should match item 2. E. on page 4)

Estimated Number of Students Participating: 9

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Conditions and Considerations

Equipment Purchase-If requesting large equipment, Project Sponsor must show proof of correspondence with OPC Administration. In addition, all other purchases must follow Procurement Guidelines.

Events-For a large event, consultation with the events coordinator is recommended.

Participant Data Collection for Public Dissemination-If Project Sponsor proposes to conduct research with human participants then it may be subject to IRB (Institutional Review Board for the Protection of Human Subjects) review. It is the Project Sponsor's responsibility to inquire with the IRB **prior** to IRA application submission to determine if the project is exempt from IRB review so that funding is not delayed. Please indicate on the cover page if your project is exempt from IRB review.

Field Trip-If approved, Identified Risks of Participation and Release Agreement must be submitted for each student to the Program Office (Public Folders-HR Forms).

IT Requirements-Requires proof of correspondence and approval from IT Administration

International Travel-Requires International Travel application be submitted to Center for International Affairs.

Risk Management Consultation-Requires proof of correspondence with Risk Management.

Space/OPC Requirements, Infrastructure/Remodel-Requires proof of correspondence with OPC Administration .

Late Submission - Requires explanation for emergency funding.

Fiscal Management: Project Sponsor's program will be responsible for all costs incurred over and above what is funded through the IRA award and will be responsible for seeing that any revenue that is intended to offset the amount of the IRA award is transferred accordingly.

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Requirements and Signatures

Please provide the following in your application:

1. **Brief Activity Description.** Describe the activity and its relationship to the educational objectives of the students' program or major.

2. **Relation to IRA to Course Offerings.** All IRAs must be integrally related to the formal instructional offerings of the University and must be associated with scheduled credit courses. Please list all classes that relate to the program proposed.

3. **Activity Assessment.** Describe the assessment process and measures that the program will use to determine if it has attained its educational goals. **Please note a report will be due at the end of the semester.**

4. **Activity Budget.** Please enclose a complete detailed budget of the entire Activity **bold** specific items of requested IRA funding. (Page 4)

5. **Sources of Activity Support.** Please list the other sources of funding, and additional support for the activity.

7. **Acknowledgment.** Project Sponsor and Program Chair acknowledge that they have reviewed and accepted the Conditions and Considerations detailed on page 2.

Rachel Cartwright 3/28/2012
Date

Amy Denton 3/29/2012
Date

Karen Carey 3/29/12
Date

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Signatures and Dates

Blake Gillespie 3/28/12
Date

Simone Alosio 3/29/12
Date

Karen Carey 4/01/2
Date

Habitat Choice in Humpback whales: A comparative study of habitat use and behavior in humpback whales, comprising field based research and service learning opportunities.

1. Brief Description:

This research experience and service learning project began in spring '09 and continued in Spring '10 and '11. To date, the course has provided students with the opportunity to participate in on-going conservation-based research into habitat preference in Hawaii's humpback whales. Students have participated in all aspects of the research, in associated outreach activities and they have had the chance to experience first-hand the unique culture of the Hawaiian Islands.

During this semester (Spring 2012), these activities have been extended to include our local marine mammal population, through the new, interdisciplinary course, Interfaces. This University 298 course is part of the Keck foundation funded Spiral Initiative and during the course, participating students are studying use of inshore habitat in our local marine mammal population. Additionally, they have been reviewing associated literature, and looking at the wider issues of how at the societal level, we relate and connect with our environment.

The continuation of these activities requested in this funding application will allow us to build on this unique foundation of student engagement and interdisciplinary study.

Field experiences will begin here in California. The academic portion of the program will comprise a university 391 course that will run on campus during Fall 2012. This will include weekly meetings and with a series of half day excursions out into the Santa Barbara Channel, to view and monitor marine mammal use of near-shore habitat in this region. Following this, during spring break 2013, enrolled students will head to Maui, Hawaii, where they will be working with a local research organization, the Keiki Kohola Project. This is a non-profit research organization that includes experienced field biologists, local boat captains and naturalists. Our students will join this research team and participate in the all aspects of their on-going study of habitat preference within this critical habitat.

Students will work in small teams to develop a detailed understanding of a particular research task assigned to them. They will then be responsible, as student mentors, for teaching fellow team members to accurately gather the data in question and for the post trip analysis of this data. Working locally, this will provide students with the chance to develop the necessary field skills prior to their field experience in Hawaii. Additionally, the data gathered here in California can be contributed towards local research efforts, and will afford the university the opportunity to reach out and liaise with local agencies such as the Channel Islands National Marine Sanctuary.

Both here in California and in Hawaii, students will meet with local management officials from the Channel Islands National Marine Sanctuary and the Hawaiian Island Humpback Whale National Marine Sanctuary. These different entities will inform our students on the politics and the practicalities of the unique challenges of marine management and conservation. Through first hand experiences on the water, combined with the information the students will gain from these meetings, students will gain a very realistic picture of the current conservation and management challenges as they pertain to the near-shore marine environment

To date, our results from the Hawaii-based portion of the study present a compelling picture of how human activity may impact marine mammal use of critical habitat.

In previous years, students have researched and produced synopses on a wide variety of management issue impacting this region, from outreach activities to underwater noise. Many of the participating students have subsequently chosen to continue these studies, incorporating their work into capstone and other independent research projects. We see this as one of the most valuable outcomes of the course, as students voluntarily pursue their own original interests, alongside the contribution that they make to the larger research effort. This year, we will again encourage students to develop their own areas of interest, and to actively research these areas during their time on the water, both here in California and out in the Hawaiian islands. On completion of the trip, students will be invited to present these studies on the Keiki Kohola Project website (www.caringforcalves.org) and to include these studies in their end of year research presentations at the Sage Research Forum.

In response to student feedback from previous years, we plan to include several cultural experiences as part of the trip: Students will take a hike through the rainforest to a waterfall, they will visit cultural sites around the island and attend a traditional Hawaiian Luau. This will ensure that their experience is well rounded and reaches beyond their own immediate disciplines and interests. Additionally, as part of our research program in Hawaii, small groups of students will travel to an adjacent island, Lanai. Lying directly across the Au'au Channel, Lanai provides a perfect comparison site for our work to date along the shoreline of Maui. Lanai sees very low levels of vessel traffic and is free of agricultural activity. Our aim will be to conduct simultaneous surveys of the use of the Maui and the Lanai shorelines. Student participants will each spend two days and one night camping on the island and conducting boat-based surveys along the shoreline of this area. Small cetaceans, such as spinner dolphin, are especially plentiful in this more remote location and pristine reefs line the shoreline too. Working for a short time in this area will allow students to experience the notable differences between these two sites. Pilot work conducted by R. Cartwright during this spring break (2012) suggests that there are favored regions used by female-calf humpback whales along this shoreline and these areas can be safely accessed by boat, as planned. From a research perspective, the monitoring of these areas will provide new and very valuable information and comprise a substantial contribution to the work that this team has completed to date.

As in previous years, we are keen to encourage students from the all programs to participate in the course. Previously, students from communications and business programs have participated in the program. Students from a range of programs are currently enrolled in the Interfaces course and we plan to maintain this interdisciplinary approach to our work, promoting the course across campus and actively encouraging applications from students outside the traditional sciences.

The content of the course as outlined addresses the larger program objectives of the Biology and Chemistry departments, as well as many of the specific objectives of Chemistry and Biology 492/494 courses.

Students who participate in the course will:

- Design experiments to test scientific hypotheses, collate data, conduct statistical analyses and evaluate research outcomes.
- Gain first-hand experience in problem solving – always a component of field research which involves animals in their natural setting.
- Identify topic appropriate research materials, synthesize information from a variety of sources and gain experience in effective communication of results in a variety of media.
- Develop communication skills and the ability to work as an effective team member in a diverse cultural setting
- Use analytic and data collection equipment in situ.
- Work as part of federally permitted research team, and contribute to ongoing efforts for the conservation of a federally listed, endangered species.

2. Relation of IRA to existing course offerings

Students will enroll in one of a number of potential courses, underscoring the interdisciplinary nature of the training and research. Biology students will enroll in either Biol 492 or 494, chemistry students will enroll in either Chem 492 or 494; in either case the course can fulfill a major requirement. Additionally, chemistry majors may substitute this course for Chem 251, Quantitative Analysis Lab. Students from other majors, for example ESRM, will be encouraged to enroll in any of these classes for credit as well. The goal is to involve students from diverse majors so that each can enrich the educational benefit of the other.

The work covered in the course complements a range of other biology and chemistry courses, including Behavioral Ecology (Biol 407), Marine Biology (312), Science and Public Policy (Biol 345) Quantitative Methods in Biology (Biol 203), Environmental Chemistry (Chem 301) and Quantitative Analysis (Chem 250/ 251).

Biology and chemistry students are already actively involved in a related laboratory based research project, under the supervision of the applicants (Chem/Bio 494), which explores the dietary and behavioral implications of blubber stratification and the ontogeny of neonate muscle tissues. The field course proposed here provides a practical, field based extension of this work and as we develop a core of students who are experienced in marine mammal studies such as this, we will be well –placed for extending this work to include more local settings, with a regional focus on the marine mammal populations of the Santa Barbara Channel.

3. Activity assessment

The course assessment will comprise two components, related to its two key deliverables:

1. Student research projects will be assessed according to a rubric that measures their engagement with research planning and preparation, design and subsequent data analysis; grades will be assigned based on this rubric.

2. A topics-based component of the course will be assessed not only by the instructors, but by members of the target audience for the different media as well, using a voluntary survey form.

The students will also complete a self evaluation of both their research and their outreach activities using a rubric that they develop at the beginning of the term.

4. Activity budget.

(Costs are based on 9 students and 2 instructors)

Field trips in California (3 x 4 hour trips @ $750 per trip)		2250
Roadrunner shuttle to LAX		460
Flights	11 x 750	8250
Accommodation	7 nights	

(Accommodation will be in two adjoining self catering duplexes)

Total accommodation:	5000
Transport – SUV for 8 days + airport shuttles	800
Food (all self catering – budget $100 per person)	1100

Research activities:

Additional Vessel hire 4 days	2000

(The Keiki Kohola Project has a small research vessel, which would be used in the project, however a second vessel would be required (see Attachment 2 for further details / explanation)

Insurance *(additional liability insurance to cover students on research boat)*	2500
Vessel running costs (Captains stipends, boat fuel, dock fees)	4500

(On boat days when two vessels are out on the water, we will require two licensed captains - total 10 boat day – 250 per day is a typical stipend for captains)

Equipment required – two ipads with GPS capabilities, required software and waterproof cases	1860

(To date, we have been using equipment that has been loaned to us from the IT department. Having equipment that is designated for the project will allow us to allow us to build up software and use the ipads throughout the course as the key repository for the research data collected).

Speakers fees	400

Cultural on island activities (Luau, locally guided hikes)	1100
Ferry trips to Lanai (round trip per student)	550
Camping fees on Lanai	90
Rental of camping gear /transport of gear from CA to HI	400
Total:	31,260
(Student contribution estimated as $500 each)	**(4,500)**
Total requested from the IRA	**26,760**

5. Sources of additional support.

The Keiki Kohola project will provide access to its research vessel, logistic support and most of the field equipment required by the students.

This represents an in-kind donation of around $2000 per student, based on current equivalent Earthwatch-type programs, which charge for participation in this type of project.

Monitoring equipment will be provided by Keiki Kohola Project. Dr. Gillespie will provide additional equipment for field measurements from his research laboratory.

Students will also be involved in fund raising activities after the trip. Planned activities include the sale of photography and t. shirts. Production costs of these items will be covered by the Keiki Kohola Project. Profits generated will primarily be donated to offset the carbon footprint of the trip.

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ACTIVITY BUDGET FOR **2012-2013**

1. Operating Expense Budget

A. Supplies	_____
B. Vendor Printing	_____
C. In-State Travel	Shuttle to LAX – 460
D. Out-of-State Travel	Roundtrip LAX – Maui: 11 X 750 = 8250
E. Equipment Rental	Additional research vessel 4 days = $2000, minivan rental - $800
F. Equipment Purchase	two ipads plus software = 1860
G. Contracts/Independent Contractors	_____
H. Honorarium	_____
I. OPC Chargeback	_____
J. Copier Chargeback	_____
K. Other (Please Specify)	See above_____
TOTAL Expenses	31,260

2. Revenue

A. Course Fees	4500
B. Ticket Sales	_____
C. Out of Pocket Student Fees (exclusive of course fees)	_____
D. Additional Sources of funding (Please specify And indicate source)	Additional support from local non profit, Field Equipment to be supplied by Chemistry dept
Total Revenue	_____
E. **Total Requested from IRA**	**26,760**

Attachment 1 – Appendix : Habitat Choice in Hawaii's humpback whales

We are pleased to inform the IRA committee that results from the first three years of this project are currently in revision, pending publication in the journal Plos One. The results are compelling and demonstrate a clear response to vessel traffic by female-calf humpback whales that use this area as a key breeding ground.

For the students involved over the last two trips, the experience of seeing their work translated into a published research study that directly addresses a key management issue in this region is certainly noteworthy. Beyond this, the study establishes the presence of CSUCI within the marine mammal research community, but perhaps most importantly, this study will make a real and tangible contribution to the conservation of humpback whales in this region, by providing accurate and up to date information that is directly applicable to the management of this critical region.

Extending the study to include activities here in California will allow the university the chance to build relationships with local marine based organizations and government entities. Our focus this year will be to work with the Channel Islands National Marine Sanctuary. To this end we plan to invite speakers to campus and to ensure that the data we gather here can contribute to on-going efforts in this region to safeguard near-shore marine habitat.

Submission to PloS One, pending acceptance of revisions:

Between a rock and a hard place: habitat selection in female-calf humpback whale (*Megaptera novaeangliae*) pairs on the Hawaiian breeding grounds

Cartwright, R., Gillespie, B., LaBonte, K., Eden, K. and Sullivan, M.

Abstract
The Au'au channel between the islands of Maui and Lanai, Hawaii comprises critical breeding habitat for humpback whales (*Megaptera novaeangliae)* of the Central North Pacific stock. However, like many regions where marine mega-fauna gather, these waters are also the focus of a flourishing local eco-tourism and whale watching industry. Our aim was to establish current trends in habitat preference in female-calf humpback whale pairs within this region, focusing specifically on the busy, eastern portions of the channel. We used an equally-spaced zigzag transect survey design, compiled our results in a GIS model to identify spatial trends and calculated Neu's Indices to quantify levels of habitat use. Our study revealed that while mysticete female-calf pairs on breeding grounds typically favor shallow, inshore waters, female-calf pairs in the Au'au Channel avoided shallow waters (<20m) and regions within 2km of the shoreline. Preferred regions for female-calf pairs comprised water depths between 40-60 m, regions of rugged bottom topography and regions that lay between 4-6 km from a small boat harbor, Lahaina Harbor, which fell within the study area. In contrast to other humpback whale breeding grounds, there was only minimal evidence of typical patterns of stratification by depth or distance from shore as seen on other breeding grounds. A review of habitat use by maternal females (i.e. lactating females with an accompanying calf) across Hawaiian waters indicates that maternal habitat choice varies between localities within the Hawaiian Islands, suggesting that maternal females alter their use of habitat according to locally varying pressures. This ability to respond to varying environments may be the key that allows wildlife species to persist in regions where human activity alters their habitat.