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1-6-2003

# Summer Undergraduate Research Fellowships at the Darling Marine Center

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### Recommended Citation

Eckelbarger, Kevin J., "Summer Undergraduate Research Fellowships at the Darling Marine Center" (2003). *University of Maine Office of Research and Sponsored Programs: Grant Reports*. 259.

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**Final Report for Period:** 01/2000 - 12/2002**Submitted on:** 01/06/2003**Principal Investigator:** Eckelbarger, Kevin J.**Award ID:** 9910188**Organization:** University of Maine**Title:**

Summer Undergraduate Research Fellowships at the Darling Marine Center

**Project Participants****Senior Personnel****Name:** Eckelbarger, Kevin**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Yund, Philip**Worked for more than 160 Hours:** Yes**Contribution to Project:****Post-doc****Graduate Student****Undergraduate Student****Technician, Programmer****Other Participant****Research Experience for Undergraduates****Organizational Partners****Other Collaborators or Contacts****Activities and Findings****Research and Education Activities:**

University of Maine faculty in residence at the Darling Marine Center, supervised six REU students in the summer of 2000 and eight in the summer of 2001. In both years, we received ~10 applications for every available position. Of the 14 students selected, 11 were women (79%) and their home institutions ranged from Maine to California, including a mix of small private liberal arts colleges and larger state institutions. The students conducted independent research in the broad areas of marine invertebrate life histories, benthic marine ecology, microbial ecology, optical oceanography, and biogeochemistry. Upon arriving, students participated in a two day introductory research session covering hypothesis formulation and testing, elementary statistics, experimental and sampling design, scientific writing and data presentation, and how to give an oral presentation. Students were required to attend weekly science seminars presented by visiting faculty and were encouraged to attend evening seminars made available to the public. Students also attended a series of special seminars presented by resident faculty on their current research, as well as special sessions on choosing a science career, and all there is to know about graduate school.

**Findings:**

Students were asked to complete a questionnaire/evaluation form at the end of each summer to gauge their reaction to the REU program. In addition, the PI (Eckelbarger) and two Darling Center staff members informally chatted with students at the end of the summer to determine

what they liked/disliked about the program. Results strongly suggested that the basic program was very stimulating and that students left having a much better idea what marine research entails. Nearly all the students concluded that the internship gave them more confidence at the prospect of entering graduate school and they felt the experience met or exceeded expectations. The mix of intellectual and social activities offered during the summer appeared to be well balanced although we reduced the length of the introductory session during the second year due to student complaints. Nearly all of the students began these sessions just days after having completed final examinations at their home institutions so many arrived exhausted. The introductory session also included a lengthy field trip which was reduced in length in the second year.

### **Training and Development:**

All of the students in the two summer sessions were exposed to a wide variety of modern research instrumentation including, but not limited to, scanning and transmission electron microscopes, basic histology equipment, photomicroscopy and digital photography, spectrophotometers, gas and HPLC chromatographs, C-H-N-S elemental analyzers, dissolved organic carbon analyzers, and a wide variety of computer software programs. The students learned how to conduct their own research project, how to carry out library research, how to compile their results for oral presentation, and the basics of writing their results into a form appropriate for a journal. Nearly all of the students combined both field work with lab work so they had the experience of collecting field organisms and/or samples using a variety of methods including the use of the Center's 42' coastal research vessel. At the end of the summer, each student made a 15-min. Powerpoint oral presentation before faculty and graduate students in a formal mini-symposium.

### **Outreach Activities:**

Some of the REU research projects were included in an article in a mid-coast Maine newspaper and some individual interns were asked to make brief informal presentations about their research during a weekly public lecture series. REU project summaries have also been included in the Center's twice-annual newsletter, 'Making Waves' that is distributed widely to over 1500 colleges and universities, along with University alumni and supporters. Two REU student projects have been featured in Maine newspaper articles and one REU student was featured in 'Natural New England - Science & Exploration of the Northeast'. The PI is a regular speaker before many coastal Maine civic groups (e.g. Chamber of Commerce, Rotary Club etc.) and the REU is a featured part of the presentation.

## Journal Publications

## Books or Other One-time Publications

## Web/Internet Site

## Other Specific Products

## Contributions

### **Contributions within Discipline:**

All of the faculty involved in the 2-year REU program have concluded that it has had a dramatic effect on the lives of the participants. One strong indication is the fact that two REU students from the summer 2000 cohort were accepted into Ph.D. programs in marine biology and oceanography at the University of Maine beginning in the fall of 2002. Several other students have entered graduate school at other institutions as well and one reports that they are teaching high school science. Another student is now serving in a Peace Corps where they are teaching fish aquaculture (Zambia). It is our view that REU students received a concentrated dose of research experience that will help them determine in graduate school and an eventual career in marine science in the best choice for them.

### **Contributions to Other Disciplines:**

The majority of REU students in the 2000 and 2001 programs have expressed a desire to continue their education in marine science - and several are doing so now. However, at least two expressed an interest in teaching high school science (one now does in Florida), three plan to enter medical school, and one intends to study to be a veterinarian. Clearly, the REU program we offered is aimed at marine science but students receive a broad exposure to science, in general, so their options are not limited to the marine realm. In our view, the REU program teaches students how to think critically and how to express themselves - their eventual professional goals can only be enhanced by the experience.

### **Contributions to Human Resource Development:**

The REU program we conducted took a group of high-achieving students and helped them improve their professional skills through a supervised program of independent research. We believe the program greatly assisted them in making informed decisions about their career

**Contributions to Resources for Research and Education:**

**Contributions Beyond Science and Engineering:**

REU students were exposed to a wide variety of science issues during weekly seminars including such timely issues as the collapse of the New England fisheries and the role of marine scientists in aiding the commercial aquaculture industry and the development of marine policy. Students heard speakers who work actively with State and Federal agencies that deal with marine issues and they learned how marine scientists can play a role in solving large scale economic problems related to the ocean.

**Categories for which nothing is reported:**

Organizational Partners

Any Journal

Any Book

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Any Product

Contributions: To Any Resources for Research and Education