UNIVERSITY OF WASHINGTON
The Graduate School
200 Gerberding Hall
Box 351240
Seattle, Washington 98195-1240

Telephone: (206) 543-5900
Fax: (206) 685-3234

May 6, 1998

To: Lee Huntsman
Provost

From: Marsha Landolt
Dean

Re: 5-year review of Quantitative Ecology and Resource Management (QERM)

Recommended action:

The Graduate Council recommended continuation for 10 years of the authorization to grant the MS and PhD degrees through this interdisciplinary program. The Deans of the Colleges of Arts and Sciences, Forest Resources and Ocean and Fishery Sciences as well as the Graduate School would like to see this small program be more interactive than it now is. One means by which this might be accomplished is to reinstate a TA consultant position that previously had been funded by the College of Forest Resources. This consultant provided an interface between QERM and students and faculty in other programs who benefited from the quantitative expertise of the QERM students. QERM students benefited from exposure to a range of problems they would not otherwise encounter. A second means by which the program could be more interactive is to improve communication with the sponsoring units. This might include introduction of an annual report that highlights interactions QERM students have had with their counterparts in the sponsoring units (*e.g.*, seminars and consultations) and lists QERM students, their major professor, thesis topic, and graduates over the past year.

Background:

QERM is an interdisciplinary program in the Graduate School comprised of approximately 10-12 core faculty who derive their salaries from the Colleges of Arts and Sciences, Forest Resources and Ocean and Fishery Sciences. It was formed in 1990 from beginnings in the graduate Biomathematics Program, which itself began in 1969. Until 1996 it was combined with the Center for Quantitative Sciences (CQS), now administered from the Office of Undergraduate Education. QERM now occupies space in Bagley Hall. Although initially programmed into new space in the College of Ocean and Fishery Sciences, construction issues have resulted in the elimination of this commitment. The Graduate School provides a half-time administrative assistant. The Graduate School provides 3 RA positions. QERM graduates approximately 1-2 PhD and 3-4 MS students per year and has an enrollment of approximately 20 students. Attached are the self-study, the report of the review committee, a letter from Deans

Thorud, Simpson and Nowell to me relating their concerns for the program and the responses of the QERM faculty to the review committee and the Deans' letter.

QERM aims to prepare students for careers as quantitative analysts of ecological and resource management problems, in which they are likely to operate within a team of scientists with complementary backgrounds. This aim runs the risk of producing graduates who are perceived as less than independent scientists but it appears to be appropriate for careers in highly complex fields in which a variety of expertise must be brought to bear. Since graduates are to be the quantitative experts within these teams, the initial year of the program is devoted to assuring the quantitative capabilities of the student. While defendable from an academic perspective, this devotion contributes to some of QERM's problems with its parent colleges, as it appears that students become quantitatively focussed at the expense of building expertise in ecology and resource management. However, the faculty offer evidence that the training is tailored to the individual student and that those with strong quantitative backgrounds take several courses to provide a start on the ecology and resource management aspects of their education. The evidence also supports a balance of coursework actually undertaken by individual students.

The dissertation or thesis research conducted by a QERM student appears to follow more the model of student projects in the social sciences or in the humanities than that of the natural sciences. In this regard, the QERM student is perhaps more responsible for designing the thesis project than is sometimes found with students trained in an individual laboratory while being supported financially by a specific research grant. This feature may be appropriate for an interdisciplinary program as it avoids aligning the student with any single view of a problem. On the other hand, the student is more independent than is usually the case in the natural sciences, which could predispose to some misunderstanding.

The review committee noted that the program is of exceptionally high quality, producing graduates that are highly sought. It offers some criticism of the administrative issues with the program that arise from its interdisciplinary nature and the involvement of several colleges. Thus, a primary residence within one administrative unit is highly desirable. The most appropriate in the eyes of the faculty is the Graduate School, given the interdisciplinary nature of the program. The review committee also commented upon the split between the CQS and QERM, which have certain similarities. Indeed, QERM in many ways appears to be the graduate version of CQS and a split between the undergraduate and graduate programs with such similar interests may seem unwise. However, these units do work with one another. For example, QERM graduate students are prized by CQS as TAs and QERM has introduced a training program for TAs that will make them even more valuable to CQS. It should be noted that one of the recipients of the 1998 Excellence in Teaching awards, Emily Silverman, is a QERM student and a TA for CQS classes. The review committee also stated that the modeling, ecology and resource management components should be strengthened. Finally, the review committee thought that the first year of the program in particular was quite stressful for the students and that the students should get more emphasis on ecology and resource management training earlier in their careers. The program has addressed each of these issues in its reply to the review committee's report.

After receipt of the report of the review committee, the Deans of the College of Arts and Sciences, Forest Resources and Ocean and Fishery Sciences wrote a letter to me expressing their own views of the program. They criticized QERM for a lack of focus, poor integration with the university's other programs, a concern that QERM students were not being trained as independent scientists and that few were qualified for academic careers. It was further suggested that QERM develop a stronger vision before reauthorization to offer their degrees was granted and that the perceived lack of training in ecology and resource management is overcome.

QERM responded that the apparent lack of focus and lack of integration is in large part due to their success as an interdisciplinary program. There appears to be some merit in this argument. QERM faculty do seem to have a clear vision of what they want of their program and

how they expect their students to be trained. The review committee commented specifically on the high quality of the program. With regard to the training of independent scientists and successful future academics, QERM responds that they see their students as participating as the quantitative expert on a research team as described above. Indeed, even with a QERM graduate leading a research effort it is perceived that the capabilities of other members of the team would still be needed. Further, QERM answers that their students generally do not enter the program with aspirations to academic careers. Rather, they enter with the aspiration to careers in ecology and resource management in which they see quantitative skills as essential. It is also answered that the product of an interdisciplinary program does not fit well into universities administered along disciplinary lines.

QERM has undertaken several initiatives in response to the review and the Dean's letter. They will:

1. Engage in strategic planning with other units on campus, specifically the Program on the Environment and the Mathematical Biology program.
2. Introduce new coursework to strengthen the modeling part of the program.
3. Initiate a training program for TAs, which should cement their position, as those most desired by CQS for its courses.
4. Consider the addition of a milestone requirement in the second year that will emphasize the importance of ecology and resource management training to their students and to those outside the program.
5. Better inform their students of the nature and demands of the interdisciplinary experience during their first year in the program.
6. Make the program more accessible to students in other programs by developing an MS for students in the more biological programs with which they interact.
7. Streamline the MS bypass to lessen pressure in the early years and decrease time to degree.

In summary, the review committee viewed this program as strong. Nevertheless, it is truly an interdisciplinary program, which presents significant problems within a university administratively divided along disciplinary boundaries. Actually, the problem is perhaps not so much the interdisciplinary nature of the program as much as its intercollege dependence and the resulting expectations of each individual sponsor. QERM has responded to the review and comments by the sponsoring Deans with new initiatives.

c. Arthur Nowell, Dean, College of Ocean and Fishery Sciences
David Thorud, Dean, College of Forest Resources
John Simpson, Dean, College of Arts and Sciences
Debra Friedman, Associate Provost
John Slattery, Associate Dean
David Ford, Chair, QERM
Graduate Council
QERM Review Committee