22 October, 2018

TO:    Jeff Hardin, Professor and Chair, Department of Integrative Biology
       Emily Stanley, Director of Graduate Studies, FMS

FROM:  John Karl Scholz, Dean

RE:    Completion of Academic Program Review: M.S./Ph.D. Freshwater and Marine Science

CC:    Elaine M. Klein, Assistant Dean for Academic Planning
       Gloria Mari-Beffa, Associate Dean for the Natural and Mathematical Sciences
       Jocelyn Milner, Vice Provost and Director, Academic Planning and Institutional Research
       Josh Morrill, Assistant Dean for Academic Analysis, Planning and Assessment, Graduate School
       Jennifer Noyes, Associate Dean for Operations and Staff
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       Eric Wilcots, Deputy Dean, L&S

On October 16, 2018, the L&S Academic Planning Council considered materials submitted with respect to the review of the graduate programs offered in Freshwater and Marine Science. In the course of the council’s deliberations, members were provided with the self-study prepared by the program faculty, and a brief report submitted by a committee of faculty who used that self-study as the foundation for discussions with faculty, staff and students. (We should note that iBio and FMS were also offered an opportunity to provide written comment on the report, too.) Associate Dean Gloria Mari-Beffa led the discussion with the Academic Planning Council.

We were pleased to learn that the relocation of this program to L&S has been successful, and the program has adapted to its new home with little disruption to students. In discussion, the committee noted the overall quality of the program, and the general impression that it is running well, students in it are satisfied and are completing the program at a reasonable rate and pace. Members noted that the conclusions drawn in the self study are reasonable, and in particular, that it makes sense to attend carefully to diversity, inclusivity, and climate. Members found the
review committee’s recommendations to be useful, too. They were particularly supportive of the recommendation that the program do what you can to “ground” students in some sort of common experience, whether that be via a common, interdisciplinary seminar or by providing opportunities for students across the program to gather, share information, and build community. The APC also agreed with the review committee’s observation that the program’s flexibility is a strength – and they agreed with the committee that flexibility works well until it becomes ambiguity. Council members discussed in some detail the costs of “too much” flexibility, which can create confusion and foster perceptions of inequity about rigor, standards of evaluation, and milestones. All of these issues can undermine an otherwise good climate for students. Members endorsed the suggestion that a handbook should identify common milestones, and convey that information to students. Furthermore, program faculty could agree on common standards for performance relative to those milestones, though within the context of the particular expertise students develop in their studies. A “standards without standardization” approach would support consistency for students, within the flexibility that seems to have worked so well for the program.

Though not discussed at length by the review committee, we note that learning outcomes have been defined for the program at both master’s and doctoral levels, as required for all UW-Madison programs. The outcomes are distinct, reflecting the difference in level and intensity of study expected in these programs. Efforts to assess student learning, as reported in the self-study, are still somewhat new to the program; however, the faculty seems to have embraced this work as a mechanism for understanding students’ perspectives on the programs, and as a basis for future improvement. Indeed, the results of the initial assessment informed the advice provided above with regard to students’ reports about not knowing program expectations, requirements or opportunities. The program faculty have also identified the need to improve student-advisor interactions. At this point, the assessment strategy used was an indirect measure (survey); given the relatively small number of students and their productive engagement in research, it seems feasible for the faculty to incorporate direct measures of student learning relative to the broadly stated learning outcomes in future assessment exercises. We anticipate that activity arising from the last assessment initiative, as well as plans under way for future projects, will be documented in the Provost’s annual process for reporting on assessment activity.

The council approved a motion to accept this review as complete. They encourage you to create a student handbook that will communicate common requirements and policies clearly and transparently to students, to help ensure a sense of fairness within the diversity of learning experiences students have in Freshwater and Marine Sciences. The council also supports your aspiration to improve the diversity of your student body, and in support of that effort, also recommends that you consider developing a seminar or common experience to foster a sense of community among all of your students.

The APC did not require any further follow up upon conclusion of the L&S portion of this review. The next stage of the process will involve discussion by the Graduate Faculty Executive Committee, and a final review of all of these materials by the Office of Academic Planning and Institutional Research.
10-Year Review
Freshwater and Marine Science Graduate Program

Review Committee: Simon Gilroy (Chair), Jean Bahr, Mike Graham (GFEC Representative)

1) Review Process
The committee was charged by L&S Associate Dean Gloria Mari Beffa to review the Freshwater and Marine Science graduate program (FMS). FMS provided a self-study and along with this document, the committee reviewed the FMS website and additional information prepared by the Graduate School. The review committee met with the program’s Chair, the Chair of the Department of Integrative Biology (the administrative home for the graduate program), faculty members in the program, the administrative staff person and seven of the program’s graduate students. The committee’s comments below come at the conclusion of this review process.

2) Executive Summary
Since moving from the College of Engineering to Letters and Science two years ago, the FMS graduate program has continued to be successful both for the participating faculty and students. The program’s hallmark is flexibility, with no set requirements for coursework and the only major milestones for progress for each student being their prelim exams and thesis defense. In general, this flexibility serves the faculty and students well, especially the students whose interests do not fit well into the confines of other programs. However, this structure encourages students to focus almost exclusively on their thesis research while potentially missing out on a broader education in the FMS area. The flexibility within the program tailored to each individual student also limits the shared experiences for the students that might otherwise help draw in students from outside of the Center for Limnology (CFL). All but one of the students are currently in the CFL, promoting tight cohesion between this group.

3) The FMS Program
   a) Overview
The PhD program in Freshwater and Marine Sciences originally resided within the College of Engineering but 2 years ago moved to the College of Letters and Science with an administrative home in the Department of Integrative Biology. This transition now seems complete. Letters and Science provides 25% time of a staff Student Services Coordinator for the program. Having this staff support has clearly been a very important factor in stabilizing the program and helping to develop plans for an up-to-date student handbook and student tracking (see below). The program has maintained a size of 10-12 students over the last several years and normally makes offers to about four applicants per year with an average acceptance rate of approximately 50%, an acceptance rate broadly comparable to other, similar programs at the university. Although the FMS program spans colleges and has participating faculty covering a broad range of water-related fields, at present all but one of the students in the program are in labs in the CFL, which can be partly attributed to the high profile of the CFL faculty in this field, a point that is expanded upon in the section below on Intellectual Structure of the Program.

Time to degree over the last 10 years has been 6 years or less for >90% of the students and over the same period, ~83% of the enrolled students either completed a Masters or Ph.D.
degree or are still enrolled in the program. These statistics are consistent with a program delivering a successful graduate experience for the vast majority of the students.

Student support is through the home lab and consists of a mixture of mainly Fellowships, Traineeships and RAs and to a lesser extent TAships. This has been a successful model to date and the current students did not express concerns over their future funding. In addition, the mentoring environment within the program is very strong with individual faculty providing effective guidance, supporting students at levels from progress in research to future careers (see Graduate Student Experience below).

The students are able to compete for internal funding, providing important opportunities to make progress in their thesis projects. The program also encourages involving undergraduates in this research, helping foster mentoring skills for the graduate students running these projects.

On graduating, students pursue a range of careers, generally in academia and government agencies and the current students are generally pleased that the program is equipping them with skills that are suited to the job market.

b) Demographics
The 10 year average for graduate students in the program is ~75% male, and is in the single-digits for percentages of targeted minority populations. The program recognizes the need for diversity within the student body and has begun to address this issue, e.g., pursuing Advanced Opportunity Fellowship offers. Now that the program has made a stable home in L&S and has the support of a Student Services Coordinator, it is hoped that these efforts could be expanded, for example through more aggressive advertising to help build the program and also extend its visibility to prospective targeted minority students.

c) Intellectual Structure of the Program
As noted, FMS is at the extreme end of the flexibility scale in terms of both admissions requirements and course expectations. The faculty clearly value the option to recruit students whose backgrounds may be quite different from the majority of those in their home departments. They also value the flexibility to tailor the graduate program expectations to the backgrounds and goals of these students. This individually tailored approach is appreciated by the students and it also seems to be preparing them well for post-graduate careers. However, several of the students with whom we met indicated that their individual course plans focus almost exclusively on topics and skills they need to complete their individual research projects. There are no requirements (or even incentives) for them to build a broader base of expertise that would encompass physical, biologic, and chemical aspects of freshwater or marine ecosystems. Students who are based in the CFL do participate in some common seminars and special topics courses offered through the CFL, and in that way those students are developing common expertise related to freshwater ecology. It is not clear whether students who are admitted by, and working with, faculty whose research groups are not based at the CFL are likely to develop any common expertise with other graduates in the program. In this respect, as currently implemented, the program is more similar to a collection of individual majors than to one that is providing a coherent and integrated intellectual framework for future researchers and practitioners in the areas of freshwater and marine sciences.
While this flexible structure is working well for the faculty in the CFL and is appealing to faculty from other parts of campus who might occasionally recruit and supervise a FMS student, it may be missing the opportunity to develop a truly interdisciplinary cohort of students and faculty with common interests in freshwater and marine sciences. We recommend that the FMS faculty carefully consider what type of minimum structure to the curriculum might give students a broader view of the scope of freshwater and marine sciences along with opportunities and incentives to engage with the broad range of faculty who are members of the program. For example, a common course that integrates physical, biological and chemical processes could facilitate communication and collaborative interactions among graduate students from diverse backgrounds. As another option, a seminar that highlights research programs that span the full range of FMS faculty would provide students with a broader perspective on research challenges in freshwater and marine sciences. Some type of common core courses or seminars, either in the first year or throughout the graduate program, could serve to build coherence and a sense of program identity within the graduate cohort, particularly for those students who are not based in the CFL. A program that explicitly endeavors to build some interdisciplinary breadth in the freshwater and marine sciences might also enhance external visibility and student recruitment beyond that due to the strong reputation of the CFL. Increased opportunities to engage with students across the program might also offer enhanced motivation for engagement to UW-Madison faculty whose research programs relate to aquatic environments.

d) Graduate Student Experience
In the course of the review we talked with two groups of students, 7 total, 5 PhD and 2 MS. They ranged from 1st to 6th years, one was a woman. All the students we talked to were associated with the CFL, which has students from both the FMS and Zoology program (through the Department of Integrative Biology).

In the FMS program, students are admitted directly to work with a particular advisor. There are no specific required courses though many of the students take two 500-level statistics courses. The students have a week of written prelims with questions set by their committee members (but these do not seem to be mandatory). Students do have to give an oral defense of a thesis proposal. Students are involved in many seminar classes. There “tend to be annual committee meetings” – this is a program requirement but does not seem to be uniformly applied.

More generally, there is not a program handbook and the students do not seem to be very clear on the program requirements – they definitely would like to see more clarity about the requirements as well as more structure. For example, students would have liked more guidance on expectations coming in and community building at the start – there does not seem to be an initial get-together for students entering the program. They would like a nominal timeline for progress through the program and better communications about training requirements (TAing, sexual harassment…). At the same time, the students do not sense that there are students getting “lost” and taking too long to graduate. There seems to be very good communication between students and advisors. The graduate students in the program find its flexibility very appealing though one said that “flexibility is great until it turns into ambiguity”.
There does not seem to be a formal mechanism for communication between students and other committee members between the prelim (thesis proposal) and defense. There is also no codified grievance process. A lot of the program structure seems to come through the CFL. For example, the students have even had input into CFL faculty hiring priorities. This serves the CFL students well but how students outside the CFL are drawn into programmatic governance is less clear.

These issues of communication and structure aside, the students seem very happy with the program overall. Several students (and faculty) mentioned the Sapelo Island field course as an important, enriching part of their graduate education. The Trout Lake facility is also a great resource made available for FMS student research. The students like their work and their advisors and feel that they have good opportunities when they graduate. They feel that they have networking opportunities with people outside CFL and iBio, especially through other students in FMS. One student expressed an interest in some sort of computing “bootcamp”. Students benefit from some of the financial resources of iBio (e.g. awards, grants), though they thought that there could be more support and encouragement to write external grants for graduate educations such as NSF and EPA graduate fellowships. Students thought that there was support for career paths other than academia, but a number expressed the opinion that they could use more career mentoring and the issue of “how am I going to get a job not doing exactly what I am doing now?” came up. A small thing that’s worth the program knowing about: while students did not complain about salary it was pointed out that there is not a uniform policy on whether students get computers provided by their research program to do their work.

4) **Recommendations:**

The graduate program is functioning well. We see the following recommendations as potential aids for continued success and for keeping up with the changing landscape of higher education in general.

- It is important that clear guidelines and timelines for proceeding through the program be developed and communicated with the students. These should be incorporated in a graduate student handbook that also contains information on a contact person and procedures for grievances or other issues. The department notes in its self-study the need for this document and are developing it and we commend the program on recognizing this as a high priority. Many departments have such guidelines and documents that the FMS program can use as a template.

- While flexibility is an important and appealing aspect of this program, the absence of structure, especially with regard to graduate coursework, may disadvantage students in their career opportunities, especially, but not solely, for students seeking academic positions. Attention should be paid both to courses and other preparation that advance the students’ progress in their thesis work and those that build a reasonably broad foundation in core areas of freshwater and marine sciences. As noted in the section on intellectual structure, this could be accomplished through one or more common, integrative courses or seminars.

- The program should establish clear guidelines for an annual student progress report. Possible models include a written report submitted to the Student Services Coordinator or an annual committee meeting where the committee signs off on progress and plans.
• The program has a 2 year rotation for the chair. We suggest the faculty discuss changing this to a 3 year term to help with programmatic continuity and capitalize on the expertise the program chair develops over the first year in this position.

• The program should request permission, when possible, to modify its RA rate structure to allow for students to be awarded stipends that are comparable to others in the labs in which they are based.

• The program should explore options to provide more formal orientation to new FMS students, including opportunities for them to meet continuing students and faculty from across the FMS program.