The goal of the Biological Sciences MS program is to provide students with the knowledge and skills necessary to succeed in the job market or advanced study.

1. Assessment information collected

1.1. Knowledge

Students graduating from the biological sciences MS program should possess breadth and depth of biological knowledge. Each incoming student meets with faculty before classes begin to review the undergraduate transcript and discuss whether remedial coursework or additional breadth is recommended. Until spring semester 2016, the assessment interview was administered by two members of the Biology & Wildlife Comprehensive Exam Committee and two members of the student’s graduate advisory committee. In spring semester 2016, the interviews were suspended pending faculty review of the procedures. That semester, the need for additional coursework was established during a more informal meeting between student and major advisor. Proposed changes to the assessment process were still underway when this report was prepared.

Established students are expected to demonstrate knowledge of biology related to the thesis project. This is assessed using the Comprehensive Exam, administered by the Graduate Advisory Committee. Ideally, the exam is conducted before the end of the first year. To pass both written and oral portions of the Comprehensive Exam, a student must write a research proposal, present the proposal orally to the committee, and answer questions about the project and, more broadly, about biology subject areas relevant to the thesis. Fourteen MS students took their Comprehensive Exams between 2012 and 2016. All passed both written and oral portions of the exam on the first attempt.

1.2. Communication of Science

MS students should make a contribution to scientific knowledge in their field of study, communicated in oral and written form. To assess this objective, we evaluate two criteria.

First, students must write a thesis, publically present their results, and defend the work in an oral exam setting. The Graduate Advisory Committee assesses the quality of the written thesis and its defense. Fifteen students defended their theses during the period of record and all were successful on both written and oral portions of the defense.
Second, we expect students to publish papers and make presentations at professional meetings. Additionally, students should also write grant proposals, in order to gain feedback on their ideas, help support their research, and develop this important professional skill.

We expect MS students to produce 1-2 publishable manuscripts from a thesis. Students in the Biological Sciences MS program generally begin to publish their research after they write the thesis and complete their degree program, so it often takes several years for thesis-related research to appear in the literature. In order to assess frequency of publication by MS students, a search of the peer-reviewed literature indexed by Web of Science was conducted in late April 2016, tabulating the number of papers on which the student was first author and the total number of papers on which the student appeared anywhere in the author list. No student graduating between 2014 and 2016 had published a paper as first author, which is not surprising given the short timeline and the lag between submission and publication. However, students appeared as authors somewhere within the author list at an average of 0.15 papers per student; typically these resulted from collaborations between the student and the advisor or other students in the lab. Students graduating between 2012 and 2014 had published an average of 0.6 publications as first author and 1.0 overall.

![Graph](image)

**Fig. 1.** The average number of publications by graduates of the biological sciences MS program. Error bars are standard errors.

The frequency with which MS students presented their work was assessed using a survey of student activities, delivered annually in May. 76% of MS students (n = 28) completed the survey in May 2015; 2016 data were not available when this report was due. Of those completing surveys, 62% (21 students) delivered at least one presentation during 2014-15 and the average number of presentations per student was 1.2. Both the percentage of students giving of presentations and the average number of presentations per student were higher than the previous 2-year period (2012-14: 53% of students, 0.7 presentations per student). The types of presentation reported were oral presentations and poster
presentations at meetings and conferences, of which 38% were local, 38% were regional, and 23% were national or international.

Proposal writing frequency and success were also assessed using the 2014-15 survey. 90% of the 21 respondents reported applying for at least one research grant, fellowship, scholarship, and travel grant proposal during the year, and on average MS student respondents submitted 3.3 applications each. Both the frequency of students engaged in proposal submission and the average number of submissions per student were quite a bit higher than the previous reporting period (2012-14: 67% submitted at least one proposal; average 1.3 proposals per year). Of the total proposals, 35% (n=24) were submitted to external agencies and institutions, including National Science Foundation (NSF), Sigma Xi, and the Audubon Society, and 65% were submitted to competitions internal to UA or UAF, including NIH-funded programs INBRE and BLaST, the Center for Global Change, and UAF Foundation-administered scholarships and grants. Overall, 51% of the 69 proposals were funded, with a higher success rate for internal (33%) than for external competitions (67%).

1.3. Occupation

The department’s goal is for students to obtain placement in PhD or MD degree programs or move directly into high-quality jobs in the biological sciences, where they may contribute to disciplinary knowledge and influence policy through research, teaching, and management. We track student employment by communicating directly with former students, surveying former major advisors, and by using online resources. The majority of MS students graduating over the past 6 years (89%) have entered PhD or MS programs or are employed within the discipline (Fig. 2). Of the 13 graduates over the past two years, 11 are in doctoral programs or employed in the discipline, one is unemployed, and the employment status of one is unknown.
2. **Conclusions drawn from the information summarized above**

The UAF biological sciences MS program is successful by most assessment measures. Students are passing their comprehensive exams the first time. The percentage of students actively presenting their research and writing proposals for funding is commendable. And the majority graduates are obtaining positions in higher degree programs or employment relevant to their discipline.

One potential area of improvement is the publication rate, which appears somewhat lower than our expectation of 1-2 publications per thesis 3 - 4 years post-graduation. However, the number of publications reported here may be conservative because only a subset of all journals are indexed by Web of Science. We cannot compare these numbers directly to those reported in previous SLOA summaries because previously we used student-reported statistics to calculate publication rates. Self-reporting was an unreliable way to survey publications because students generally fail to communicate with the department after they graduate.

Another potential area of improvement is the duration of the MS degree program. During the past two years the median time to degree was 4.0 years (n = 13). This is an improvement over the median 4.7 year time to completion during the 2012-14 period of review, but it is still too long.

3. **Curricular changes resulting from conclusions drawn above**

The faculty has discussed the MS degree duration issue at length and taken action. In 2014, the department increased expectations for academic achievement at admission. As a result, the average GRE scores and grade point average of students accepted into the program have increased (though not significantly), and we hope that better preparation will reduce the time necessary to complete the program. The trend is in this direction. The faculty has also undertaken a year-long review of our MS Assessment Interview and Comprehensive Exam practices (the latter was ongoing when this report was finalized).

One action we can take to improve the publication record of our MS graduates is to ensure that there is sufficient space in BIOL F604, Scientific Writing, Editing, and Revising in the Biological Sciences for students who wish to take the course. If necessary we will consider offering the course both semesters.

We continue to improve our methods of data collection related to assessment.

4. **Identify the faculty members involved in reaching the conclusions drawn above and agreeing upon the curricular changes resulting**

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