Wildlife Biology Program
2020 Assessment Report

All areas shaded in gray are to be completed by the department/program.
This document will be posted online and must be accessible electronically (including appendices).

MISSION STATEMENT
The Wildlife Biology Program has a focus on the ecology and conservation of free-living organisms and their habitats. We seek to provide the highest quality program contributing to the knowledge and conservation of wildlife in Montana, the region, and the world. To accomplish this, we (1) teach and administer B.S., M.S., and Ph.D. programs concerned with the biological, ecological, and social/political issues underlying the conservation of wildlife and the habitats in which they live; (2) advise and prepare undergraduate and graduate students for their careers and future education; (3) link basic and applied wildlife research contributing to the information needs of resource management agencies, science-based government and non-government agencies and organizations, and the general public for research-based information; and (4) serve the university, profession, and public.

DEPARTMENT ALIGNMENT WITH PRIORITIES FOR ACTION
After listing each departmental objective, indicate which of the five Priorities for Action the objective supports. In this section, you may also briefly describe any innovative or noteworthy programs/initiatives that support the Priorities for Action.

1. **Strive to be the best**: Maintain a top-ranked wildlife biology program at UM that emphasizes excellence. A top-ranked program allows UM to recruit and retain the best fish and wildlife scientists in the world as faculty, and in turn, attract high-caliber students from Montana and across North America [Priorities for Action: 1) Place student success at the center of all we do; 2) Drive excellence and innovation in teaching, learning, and research; 5) Proudly tell the UM story]

2. **Prioritize experiential learning and professional development**: Provide students with opportunities for development of field skills and professional exposure through classes, internships, independent research, senior thesis projects, jobs, and advice from faculty mentors and the program’s undergraduate advisor. [Priorities for Action: 1) Place student success at the center of all we do; 2) Drive excellence and innovation in teaching, learning, and research; 3) Embody the principle of “Mission First, People Always”; 4) Partner with place]

3. **Deliver a comprehensive wildlife biology curriculum**: Support classes in the physical, biological, ecological, and social sciences. Offer upper-level undergraduate courses and advanced graduate courses that synthesize knowledge across these sciences and teach principles, theories, and applied techniques for managing and conserving fish and wildlife. [Priorities for Action: 1) Place student success at the center of all we do; 2) Drive excellence and innovation in teaching, learning, and research; 4) Partner with place]

4. **Advance science through research**: Ensure UM is on the cutting edge of wildlife science. Conduct rigorous basic and applied research to enhance student education and advance knowledge used to manage and conserve fish and wildlife. [Priorities for Action: 1) Place student success at the center of all we do; 2) Drive excellence and innovation in teaching, learning, and research; 4) Partner with place; 5) Proudly tell the UM story]

5. **Emphasize diversity, equity, and inclusion**: Enhance diversity and inclusion with an emphasis on expanding educational opportunities for Native American students and modifying pedagogy through
incorporation of traditional ecological knowledge (TEK). [Priorities for Action: 1) Place student success at the center of all we do; 2) Drive excellence and innovation in teaching, learning, and research; 3) Embody the principle of “Mission First, People Always”; 4) Partner with place]  

UNDERGRADUATE PROGRAM

STUDENT LEARNING GOALS and MEASUREMENT TOOLS

<table>
<thead>
<tr>
<th>Student Learning Goals</th>
<th>Exams (Written Evaluation within Class)</th>
<th>Oral Evaluation within Class</th>
<th>Major Paper within Class</th>
<th>External Evaluation of Students (S), Program Review (P)</th>
<th>Surveys (e.g., Alumni, Student, other)</th>
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<tbody>
<tr>
<td>1. Understand the biotic and abiotic environment as applied to wildlife conservation, including competencies in physical sciences, biological sciences, ecology, and specialized animal sciences.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (P)</td>
<td>X</td>
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<td>2. Increase ability to effectively communicate fish and wildlife science and issues in writing and speech to other scientists and the broader public.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (P)</td>
<td>X</td>
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<td>3. Ensure students learn field skills and have experiential learning opportunities (field trips, methods classes, internships, independent studies, and jobs).</td>
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<td>X (S,P)</td>
<td>X</td>
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<td>4. Acquire knowledge of quantitative and qualitative analysis to apply scientific methods to wildlife conservation issues, including research design, calculus, and statistics, with application to fish and wildlife.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (P)</td>
<td>X</td>
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<td>5. Develop basic understanding of social science and policy and cultivate a respect and understanding for the multiple values associated with wildlife conservation.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (S, P)</td>
<td>X</td>
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<td>6. Learn how to synthesize the variety of scientific knowledge and skills to solve problems in fish and wildlife sciences.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (S, P)</td>
<td>X</td>
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<td>7. Acquire knowledge about the wildlife profession and career opportunities through participation in extracurricular professional learning activities, student groups, seminars, independent studies, internships, and senior thesis projects.</td>
<td></td>
<td>X</td>
<td>X (P)</td>
<td>X</td>
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<td>8. Develop greater cultural awareness and an</td>
<td>X</td>
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<td>appreciation for the need to diversify wildlife and natural resource professions to responsibly and inclusively serve society.</td>
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**RESULTS and MODIFICATIONS**

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<th>Modifications made to enhance learning</th>
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<td>Science writing deficiencies continue to be noted in junior-senior level courses. There is presently a wide variance in the writing skills of our graduating seniors.</td>
<td>Intermediate-level technical and science writing courses were eliminated ~4 years ago as part of UM budget reductions. We have lacked resources to reestablish intermediate-level technical and science writing courses, which remains a significant concern for the program. Due to lack of course offerings, we dropped the technical/science writing requirement from the curriculum. Upper division writing courses in the wildlife curriculum are routinely oversubscribed, often by &gt;10 students over the cap (i.e., 30-40 students in a class intended for 25). This has hampered wildlife faculty’s ability to address writing deficiencies in advanced wildlife courses. As far as modifications, we continue to advocate with campus partners the need to offer technical and science writing courses as part of the writing curriculum on campus. We also routinely encourage students to use the writing center. We provide advanced students who complete senior theses with focused, one-on-one writing support as they complete their theses, but this does not address needs of most students in the program.</td>
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<td>Insufficient capacity to accommodate current numbers of students in curriculum classes</td>
<td>Large numbers of students in wildlife biology coupled with UM budget reductions have caused roughly 50% of required curriculum classes to be oversubscribed. Instructional capacity has been reduced in lower-division biology, chemistry, math, and statistics courses. Instructional capacity has not kept pace with student growth in upper-division wildlife and biology courses. During the past two years, several wildlife faculty members have been selected for campus administration roles, which has reduced teaching capacity further. In response, we have routinely accommodated growing numbers of students by allowing students into oversubscribed classes, but this places strain on instructors and students given the large class sizes. We have also asked some faculty to teach above their teaching loads. We still have some students each term who are unable to enroll in classes they need to stay on track with their degree requirements. As the problem grew more acute, UM supported the wildlife biology program to hire a new instructional faculty member. UM has also assisted with some adjunct hiring support. This has greatly helped alleviate some of the challenges, although more teaching capacity will be needed to fully accommodate student numbers in wildlife biology. With this help, we are meeting needs of most students in spite of a significant capacity challenge.</td>
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<td>Large class sizes associated with high enrollment has led to challenges with quality of classroom educational experience and student retention in our major.</td>
<td>Students and occasionally parents have expressed frustration over large class sizes. In an effort to enhance learning in large classes, we incorporated Learning Assistants (LAs) into a number of our curriculum classes. LAs are undergraduates</td>
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<td>Enhanced capacity in honors bio-statistics and statistics computer programming.</td>
<td>In response to student requests, several years ago we added an additional section of honors bio-statistics (WILD 240) and incorporated a statistics computer programming course (Program ‘R’) in collaboration with DBS. Each of these classes have led to increased student success in key upper division curriculum classes. Student feedback has been extremely positive in response to these additional course offerings during the most recent assessment period. We have therefore placed a high priority on continuing these course offerings despite teaching capacity challenges.</td>
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<td>Enhanced capacity in fisheries, aquatic ecology, conservation genetics, and aquatic field techniques</td>
<td>We hired a new faculty member five years ago with specialties in aquatic ecology and conservation genetics. He developed and implemented multiple new course offerings that have enhanced our aquatic course offerings and created opportunity for additional student growth in our aquatic wildlife option. During this assessment period, he developed and offered a 200-level fisheries field techniques course, which students have long asked for. We are in the process of now formally adding the fisheries techniques course as a curriculum requirement.</td>
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<td>Enhanced capacity in policy and public administration</td>
<td>During this assessment period, perhaps our most significant modification to enhance learning was creation of a 4+1 program in collaboration with the Public Administration Program in UM’s Law School. UM students can now earn a B.S. in Wildlife Biology and a Masters in Public Administration in five years. We did this in response to employer requests for students to gain more policy and administration experience. It was the first program of its kind in the U.S. At least one other university has since followed suit. Additionally, our endowed Boone and Crockett Professor of Wildlife Conservation created the Demmers’ Scholar Program at UM, which gives students the opportunity to complete a wildlife and natural resource policy internship in Washington, D.C. To our knowledge, only two other universities in the U.S. offer something similar for wildlife and natural resource students.</td>
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<td>Enhanced coursework and experiential learning associated with hunting and wild sustenance.</td>
<td>Several of our wildlife faculty in coordination with students have put forth considerable effort to expand educational and hands-on learning opportunities about hunting and wild sustenance in response to a desire from students to learn more about these topics and to gain direct exposure and experience.</td>
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<td>Expanded emphasis on diversity, equity and inclusion</td>
<td>We formally created a Wildlife Biology Diversity, Equity and Inclusion Committee to focus on enhancing our efforts to support a more diverse and inclusive program. We hired a new teaching-focused faculty member in wildlife biology who is Hispanic and inspirational. He started in August 2020 and has helped our faculty and students on a number of fronts to enhance and support DEI. Most notably, he established a SACNAS chapter at UM (Society for Advancement of Chicanos/Hispanics and Native Americans).</td>
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| Increased academic advising support | Several years ago we increased our professional academic advisor position from 0.75 to 1.0 FTE, thereby increasing academic support for students. While this led to a notable improvement, the advisor is still responsible for meeting the
FUTURE PLANS FOR CONTINUED ASSESSMENT

The Wildlife Biology Program will continue to assess its overall effectiveness across a number of areas as described below.

1. Curriculum. We will continue to examine our curriculum relative to standards put forth by professional societies (The Wildlife Society and American Fisheries Society) and employers (e.g., federal and state agencies, non-governmental organizations). It is important students graduate with the knowledge, skills, and training necessary for employment and for certification as professional biologists. During the most recent assessment period, employer input prompted us to establish a 4+1 in collaboration with UM’s Public Administration Program, allowing students to complete a B.S. in Wildlife Biology and a Masters of Public Administration in five years (normally it would take a student 6 years in two separate degree programs).

2. External Program Review. The Wildlife Biology Program is a professional program, and therefore, undergoes periodic programmatic review. This review includes an assessment of the depth and breadth of teaching, the exposure to professional development and placement of our undergraduate and graduate students, as well as the rigor of our research and impact to the field of fish and wildlife management and conservation. We underwent an external program review during this assessment period (AY 19-20), which provided invaluable insights and recommendations into nearly every aspect of our program. We will be following up on the recommendations associated with our most recent program review for the next ~five years.

3. Technical and Science Writing. We will continue to assess our students’ writing through upper division writing assignments within our curriculum, especially given elimination of Intermediate-level technical and science writing course offerings.

4. Classroom evaluations. We will maintain a robust and rigorous evaluation of student achievement via exams, laboratory reports, writing assignments, oral presentations, and other class assignments to ensure our subject-matter learning outcomes are achieved.

5. Enrollment. We will continue to track our enrollment numbers, which is a good indicator of overall program effectiveness relative to recruiting, retaining, and educating students.

6. Capacity. We will monitor wildlife biology enrollment relative to our capacity to enroll students in curriculum classes. We currently have more students than we can accommodate in certain classes, leading to key bottlenecks in the curriculum that delay student progress. Such monitoring will help us make strategic decisions to align course offerings with enrollment.

7. Undergraduate surveys. We will survey our undergraduate students prior to graduation to understand their experience relative to academic advising, curriculum content, experiential learning, and other aspects of our program.

8. Alumni surveys. We have not conducted an alumni survey specifically for the Wildlife Biology Program in a decade. We plan to send out a survey in 2021, although we have been attempting to do this for several years and not been able to do so. We have found this to be a significant challenge for a number of reasons. Our experience suggests UM lacks consistent and coherent direction for conducting alumni surveys at the program level. It is challenging to secure permissions and support to independently conduct an alumni survey. We also discovered that email addresses are lacking for roughly half of our wildlife biology alumni in the UM alumni database, which complicates our ability to conduct a reliable survey. We will keep working through the challenges and hope to complete a defensible survey in 2021.
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<td>3. Ensure students learn necessary field skills and have experiential learning opportunities (field research).</td>
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<td>4. Acquire knowledge of quantitative and qualitative data analyses to apply science-based methods to wildlife conservation issues, including research design, calculus, statistics, modeling and application of these analytical techniques to fish and wildlife research and management questions.</td>
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<td>7. Acquire knowledge about the wildlife profession and career opportunities through participation in professional meetings and societies, student groups, seminars, and thesis/dissertation research.</td>
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<td>The UM Wildlife Biology Program is considered a top-ranked wildlife program in North America based on its research accomplishments (publications, citations, grant dollars, awards). Graduate student research accomplishments are key to the program’s success. Graduate students are frequently first author on many of the publications that led to the top ranking.</td>
<td>The Wildlife Biology Program has attracted some of the top fish and wildlife researchers in the world as faculty, which in turn has allowed the program to attract extremely high caliber graduate students. Research is the core of the graduate student’s learning process. High quality research leads to high quality education.</td>
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<td>Student attrition rates are presently low. Most wildlife biology graduate students at UM excel as students, teachers, and researchers. These students graduate successfully and have nearly 100% placement rates in subsequent graduate, post-graduate, or professional positions. On rare occasion, however, a student who enters our graduate program with strong credentials fails to perform satisfactorily and ultimately fails to graduate. The performance failure may relate to field or lab work, interaction with collaborators, data analyses, work ethic, or a combination of factors. During this 2-year assessment period, we had one student transition to a different PhD program at UM and one student dropped from the program. Our current program size is ~65 students. Thus, the attrition rate is &lt;5%.</td>
<td>Rigorous screening procedures have been put in place by faculty so that only highly competent and qualified students are selected to pursue graduate programs. The Wildlife Biology Graduate Admissions Committee separately reviews application materials for all students applying to graduate school in WBIO at UM. A student must be approved by both the graduate advisor and the Graduate Admissions Committee before acceptance into the program. Any student failing to meet a minimum qualification must be approved by the entire wildlife biology faculty prior to acceptance into the program.</td>
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<td>A few of our graduate students struggle to meet stated timelines for completion of their research proposals and comprehensive exams, which complicates their ability to graduate within the allowable timeframe. During the assessment period, we placed 2-3 graduate students on probation each year, equating to a probationary rate of ~3-4%. Aside from the student who was dropped from the program, these students were successfully removed from probation after meeting the requirements. The Coronavirus pandemic negatively impacted some students’ progress due to remote learning challenges and impacted or canceled field seasons during 2020.</td>
<td>A Wildlife Biology Graduate Evaluations Committee was put in place to annually evaluate each graduate student's progress toward degree completion. Students who fall behind are given warnings and placed on probation until they complete the necessary requirements to get back on track. This process has worked very well for keeping students on track with graduate requirements and for quickly identifying and remedying problems when they occur. Appropriate accommodations were made for students whose research progress was negatively impacted by the pandemic.</td>
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<td>Comprehensive oral and written exams for PhD students continue to be an important measurement tool for identifying any deficiencies in broad-based knowledge of fish and wildlife science or analytical thought processes. Consistent with expectations, some students during the assessment period passed both comprehensive and oral exams with “flying colors”, demonstrating a high degree of competency. Other students were assigned additional obligations to address noted deficiencies.</td>
<td>Rigorous screening procedures are put in place so that only highly competent and qualified students are selected to pursue PhD programs, minimizing the potential for selecting individuals with significant deficiencies. When one or more key deficiencies are identified in exams, students are assigned follow-up actions to ensure the deficiencies are satisfactorily addressed before a student is allowed to defend his/her dissertation and graduate. This process has worked extremely well for the program and represents the pinnacle of academic assessment.</td>
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<td>We made considerable progress during this past two-year assessment to increase diversity within our graduate program. We admitted 8 Native American graduate students into our program during this assessment period. We also created a diversity, equity, and inclusion committee within wildlife biology to place an emphasis on creating and fostering a welcoming, inclusive environment for indigenous students and other students from underrepresented groups.</td>
<td>Our faculty took a number of steps to be intentional about expanding graduate education opportunities for Native Americans and other students from underrepresented groups: 1) invited to UM a wildlife faculty member from Purdue who has a successful record of mentoring Native students, 2) strengthened relationships and interactions with Salish-Kootenai College faculty and students, 3) developed relationships with UM Native scholars, 4) developed relationships Native scholars who are leaders in fish and wildlife conservation, 5) reevaluated role of GREs in graduate admissions to prevent the GRE from being a barrier to Native student admission into our graduate program, and 6) securing funding to support Native graduate students.</td>
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<td>Wildlife graduate student cohesion and sense of community is generally strong based on graduate student feedback. However, the global Covid-19 pandemic impacted students by preventing face-to-face gatherings. A number of students reported loneliness and a reduced sense of community during the pandemic. Individual student experiences varied greatly based on a host of factors tied to personal circumstances.</td>
<td>Wildlife biology graduate students self-organize the Wildlife Biology Graduate Student Association (WBGSA). Officer positions include an Administrator, Graduate Seminar Coordinator, Faculty Liaison, and Undergraduate Liaisons (Aquatic and Terrestrial). Students regularly communicate among themselves during weekly graduate seminar. Additionally, the WBGSA completed a “Wildlife Biology Graduate Student Survival Guide: A guide for grad students by grad students.” The Guide demonstrates the unity and collaborative spirit prevalent among our graduate students. During the pandemic, our WBGSA held a variety of virtual gatherings to preserve a sense of community. Faculty also held virtual “listening/gathering” sessions where students could ask questions and otherwise have time to interact with faculty and others students.</td>
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<td>During this assessment period, mental health became a growing concern that was exacerbated by the Covid-19 pandemic. Prior to the pandemic, we learned that many of our graduate students experience some form of mental illness, consistent with national statistics that reveal graduate students experience high rates of mental health challenges. The pandemic generally intensified mental health issues, further elevating the importance of the issue. One factor commonly cited among graduate students as leading to mental health issues is financial stress and inadequate health care. Unlike our peer institutions, we do not provide health coverage for graduate students as a standard practice.</td>
<td>We formed an ad-hoc mental health committee within the wildlife program to address the issue. It was comprised of faculty, a post-doctoral student and graduate students. The committee made considerable progress by: 1) highlighting important mental health data, 2) developing information sheets to make health resources more widely known among students, 3) inviting Curry Health Center staff to provide information and presentations to faculty and students, 4) researching and summarizing options for securing health care both within and external to UM, and 5) creating a forum to focus on student mental health. The committee was also instrumental in working with wildlife biology graduate students and faculty and peers across campus to call for higher graduate stipends and health coverage.</td>
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<td>We have adequate structures in place to facilitate routine interaction among faculty and graduate students, but similar to comments above, our success on this front was temporarily impacted by the Covid-19 pandemic.</td>
<td>We hold a robust graduate seminar in wildlife biology during both fall and spring semesters, which is well-attended by both faculty and graduate students. Faculty graduate advisors hold regular ‘lab meetings’ with students comprising their research labs. A graduate student liaison regularly attends faculty meetings to facilitate communication on program issues. We continued these functions during the pandemic, but they necessarily were transitioned primarily to virtual formats.</td>
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<td>We implemented a new orientation procedure for graduate students in collaboration with other grad programs in the Franke College of Forestry and Conservation. We did this in response to past feedback that new graduate students were critical of our “onboarding” process. The new, more extensive orientation has been well received.</td>
<td>The wildlife biology program held a more comprehensive “new student” orientation beginning in Fall 2018 semester, which has been received well by students. Orientation included a detailed review of graduate program policies and procedures, introductions to key staff, how to complete paperwork, and informal gatherings with faculty and other graduate students.</td>
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Learning Goal results

Arguably the biggest challenge for our graduate students has been lack of dedicated administrative support. Since all students conduct research and are dependent on funding, sufficient administrative support is key to their learning success. Without adequate support, students spend considerable hours dealing with contracts, paychecks, health care coverage, among other issues that take them away from their focus on coursework, research, and teaching. During the past 2-yr assessment period, we had an unprecedented number of students miss paychecks, which caused considerable duress to those students that distracted from their learning.

Modifications made to enhance learning

UM’s overall enrollment decline has led to budget reductions that impact all programs. The Wildlife Biology Program lost its administrative assistant in December 2017 due to UM’s voluntary severance offer. Roughly half of that position’s responsibility was to provide support for wildlife biology graduate students. The position still hasn’t been replaced. Presently, the Franke College of Forestry and Conservation (FCFC) is in the process of backfilling the FCFC dean’s administrative assistant, who will be directed to primarily provide support to the wildlife biology program to address the program’s lack of administrative support.

FUTURE PLANS FOR CONTINUED ASSESSMENT

The Wildlife Biology Program will continue to assess its overall effectiveness across a number of areas as described below.

1. Graduate Student Committees. Graduate student committees form the bedrock of our graduate student assessment. Graduate committees evaluate student performance at each step of the program, from course selection and project development to final defense of the thesis or dissertation.

2. Graduate Admissions Committee. A robust and rigorous process for selecting top-tier graduate students is critically important for the program’s overall success and efficiency with graduate education. Presently and looking forward, the Graduate Admissions Committee is reassessing how we evaluate students for admission, with the express intent to remove admission barriers for students from underrepresented groups.

3. Student evaluations and assessments. We will maintain a robust and rigorous evaluation of graduate student performance relative to research proposal development and defense, graduate courses, teaching, research, presentations at professional meetings and in graduate seminar, comprehensive examinations, and preparation/defense of theses and dissertations.

4. Graduate Evaluations Committee. Our graduate evaluations committee is key to monitoring progress of our graduate students from start to finish.

5. External Program Review. The Wildlife Biology Program is a professional program, and therefore, undergoes periodic programmatic review. This review includes an assessment of the depth and breadth of teaching, the exposure to professional development and placement of our undergraduate and graduate students, as well as the rigor of our research and impact to the field of fish and wildlife management and conservation. Our most recent external program review occurred in 2019-2020.

6. Enrollment. We will continue to track our graduate student enrollment, which is a good indicator of overall program strength and effectiveness in securing external research funding.

7. Alumni surveys. We have not conducted an alumni survey specifically for the Wildlife Biology Program in a decade. We plan to send out a survey in 2021, although we have been attempting to do this for several years and not been able to do so. We have found this to be a significant challenge for a number of reasons. Our experience suggests UM lacks consistent and coherent direction for conducting alumni surveys at the program level. It is challenging to secure permissions and support to independently conduct an alumni survey. We also discovered that email addresses are lacking for roughly half of our wildlife biology alumni in the UM alumni database, which complicates our ability to conduct a reliable survey. We will keep working through the challenges and hope to complete a defensible survey in 2021.
APPENDICIES

1. Graphical Depiction of Undergraduate Curriculum
2. Undergraduate Curriculum Map
3. Educational requirements to become a Certified Wildlife Biologist by The Wildlife Society
4. Educational requirements to become a Certified Fisheries Biologist by the American Fisheries Society
5. Minimum education requirements for federal Wildlife and Fishery Biologist positions
6. Policies and Procedures (Graduate Regulations) for Graduate Students in Wildlife Biology at UM
7. Graduate-level courses available to graduate students
8. University of Montana Wildlife Biology Program – External Program Review Self-Study Narrative (without Appendices) - 2019
Appendix 1. Graphical Depiction of Undergraduate Curriculum

- Biology
  - Genetics
  - Biological Sciences
  - Chemistry
  - Evolution

- Study of Organisms
  - Fishes
  - Birds
  - Mammals
  - Plants

- Biological Sciences
  - Chemistry

- Evolution

- Writing
  - Seminar
  - Communication
  - Speech

- Math & Statistics
  - Human Dimensions
  - Policy

- Conservation & Management
  - Fish
  - Wildlife
  - Populations

- Ecology
  - Field-based
  - Freshwater
  - Terrestrial
  - Physiological

- Communication
  - Strategic Communication
Appendix 2. Undergraduate Curriculum Map – Connecting Learning Goals to Courses in the Curriculum

Learning Goals:

1) Understand the biotic and abiotic environment as applied to wildlife conservation, including competencies in physical sciences, biological sciences, ecology, and specialized animal sciences.
2) Increase ability to effectively communicate fish and wildlife science and issues in writing and speech to other scientists and the broader public.
3) Ensure students learn necessary field skills and have experiential learning opportunities (field trips, methods classes, internships, independent studies, and jobs).
4) Acquire knowledge of quantitative and qualitative analysis to apply scientific methods to wildlife conservation issues, including research design, calculus, and statistics, with application to fish and wildlife.
5) Develop basic understanding of social science and cultivate a respect and understanding for the multiple values associated with wildlife conservation.
6) Learn how to synthesize the variety of scientific knowledge and skills to solve problems in fish and wildlife sciences.
7) Acquire knowledge about the wildlife profession and career opportunities through participation in extracurricular professional learning activities, student groups, seminars, independent studies, internships, and senior thesis projects.
8) Develop greater cultural awareness and an appreciation for the need to diversify wildlife and natural resource professions to responsibly and inclusively serve society.

For each table below, column headings numbered 1-7 correspond to the program’s learning goals stated above. An ‘X’ in a column indicates that the corresponding learning goal is met by the specified course.

**Freshman Year**

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<sup>a</sup>NRSM 200 and WRIT 325 were eliminated as part of UM budget reduction implemented in AY 2016-17. We were able to provide a one-time offering of WRIT 325 in collaboration with Davidson Honors College, but that is not a sufficient or sustainable solution. They are included in this table only to emphasize our desire to have these courses in the curriculum.

<sup>b</sup>There is insufficient capacity in WRIT 201 for all wildlife biology students. Presently, wildlife biology students are allowed to take any intermediate level writing requirement that is approved by UM. However, many of these classes (e.g., creative writing, poetry) do not meet our learning goals.
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### Senior Year – Terrestrial Option

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*This set of course options allows students to select a more specialized, upper-level course that most directly aligns with their interests in fish and wildlife (Applied Wildlife Management, Collaborations in Natural Resource Decision Making, Conservation Genetics, Ecology of Infectious Diseases, Recreation Behavior). As mentioned in our report, we do not have space within our curriculum to require each of these classes.*

### Junior Year – Aquatic Option

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### Senior Year – Aquatic Option

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*This set of course options allows students to select a more specialized, upper-level course that most directly aligns with their interests in fish and wildlife (Applied Wildlife Management, Collaborations in Natural Resource Decisions, Conservation Genetics, Ecology of Infectious Diseases, Recreation Behavior). As mentioned in our report, we do not have space within our curriculum to require each of these classes.*
Appendix 3. Educational Requirements to become a Certified Wildlife Biologist by The Wildlife Society

A. Wildlife Management and Biology, *minimum 12 semester hours*
   a. Courses emphasizing the principles and practices of wildlife management and an understanding of the biology of wildlife species and their habitat relationships as the basis for management.

B. Ecology, *minimum 3 semester hours*
   a. Courses in general plant or animal ecology (excludes human ecology).

C. Zoology, *minimum 9 semester hours*
   a. Courses in the taxonomy, biology, behavior, physiology, anatomy, and natural history of vertebrates and invertebrates.

D. Botany, *minimum 9 semester hours*
   a. Courses in general botany, plant anatomy, plant genetics, plant morphology, plant taxonomy, plant physiology, and other botany courses.

E. Physical Sciences, *minimum 9 semester hours*
   a. Includes courses such as chemistry, physics, geology, or soils with at least two disciplines represented.

F. Basic Statistics, *minimum 3 semester hours*
   a. Course(s) in basic statistics.

G. Quantitative Sciences, *minimum 6 semester hours*
   a. Courses in calculus, biometry, college algebra, advanced algebra, trigonometry, systems analysis, mathematical modeling, sampling, computer science, or other quantitative science. Elementary algebra, remedial algebra, and introductory personal computing courses do not count in this category. Geographical Information Systems courses may count if they incorporate analytical components through data collection, analysis, and interpretation.

H. Humanities and Social Sciences, *minimum 9 semester hours*
   a. Courses such as economics, sociology, physiology, political science, government, history, literature, or foreign language.

I. Communications, *minimum 12 semester hours*
   a. Courses designed to improve communication skills such as English composition, technical writing, journalism, public speaking, or use of mass media.

J. Policy, Administration, and Law, *minimum 6 hours*
   a. Courses that demonstrate significant content or focus on natural resource policy and/or administration, wildlife or environmental law, or natural resource/land use planning will apply in addition to courses that document contributions to the understanding of social, political, and ethical decisions for wildlife and natural resources management.

Notes:

- Course semester hours may be divided, but not duplicated, among two categories when a course covers material in more than one category.
- Comparable experience may be substituted for educational experience, however, the applicant must have at least one college or university course in each category.

Appendix 4. Educational requirements to become a Certified Fisheries Biologist by the American Fisheries Society

A. **Fisheries and Aquatic Sciences.** Four (4) courses; three of which must be directly related to fisheries science. At least one course must cover principles of fisheries science and management and one course must cover fisheries and/or aquatic sampling techniques or its equivalent.

B. **Other biological sciences courses.** When added to the above courses must total 30 semester or 45 quarter hours.

C. **Physical sciences courses.** Must total 15 semester or 22 quarter hours.
   a. Physical sciences category courses include chemistry, physics, soils, geology, hydrology, earth science, astronomy, and meteorology.

D. **Mathematics and statistics courses.** 6 semester or 9 quarter hours. Must include one calculus and one statistics course, or two statistics courses.
   a. Must include one calculus and one statistics course, or two statistics courses.

E. **Communications courses.** Must total 9 semester hours.
   a. Must total 9 semester or 13 quarter hours in communication courses that require oral and written communication skills. A minimum of 3 semester hours or 4 quarter hours must be completed in oral communications and a minimum of 3 semester hours or 4 quarter hours must be completed in written communications. The remaining semester or quarter hours can be in either oral or written communications. Communication intensive courses, if officially designated as such by the college or university, can be applied in this category. However, if such courses are used in this category, they cannot be counted in another category (e.g., Category A).

F. **Human dimensions courses.** Must total 6 semester or 9 quarter hours.

G. **Work experience.** (e.g., seasonal job, internship, formal volunteer position)
   a. Work experience may be used in lieu of formal course credits in each of the subject areas to satisfy credit requirements. A maximum of up to 6 semester or 9 quarter hours of work experience may be counted for professional certification, with no more than 3 semester or 4.5 quarter hours counted towards each subject area. Experience gained through a research assistantship as part of a graduate degree will not be considered for a discount.

Appendix 5. Minimum education requirements for federal Wildlife and Fishery Biologist positions.

A. Wildlife Biologist
   a. **Description:** Positions that require professional knowledge and competence in the science of wildlife biology to perform work involving: the conservation, propagation, management, protection, and administration of wildlife species; or the determination, establishment, and application of biological facts, principles, methods, techniques, and procedures necessary for the conservation and management of wildlife resources and habitats.
   b. **Qualification Requirements:** Successful completion of a full four-year course of study in an accredited college or university leading to a bachelor’s or higher degree in biological science which includes at least 12 semester hours in subjects such as general zoology, invertebrate or vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, entomology, or research courses in such subjects. Excess coursework in wildlife biology may be used to meet the zoology requirements where appropriate. Additionally, the position requires nine semester hours in wildlife courses such as mammalogy, ornithology, animal ecology, and wildlife management or research courses in the field of wildlife biology; and nine semester hours in botany or the related plant disciplines, or an appropriate combination of education and experience.

B. Fishery Biologist
   a. **Description:** Positions that require professional knowledge and competence in science of fishery biology to perform work including: developing, conserving, managing, and administering fishery resources; and evaluating the impact of construction projects and other socioeconomic activities that present potential or actual adverse effects on fishery resources and their habitat.
   b. **Qualification Requirements:** Successful completion of a full four-year course of study in an accredited college or university leading to a bachelor’s or higher degree with a major in biological science which includes at least six semester hours in aquatic subjects such as limnology, ichthyology, fishery biology, aquatic botany, aquatic fauna, oceanography, fish culture, or related courses in the field of fishery biology; 12 semester hours in animal science in such subjects as general zoology, vertebrate zoology, comparative anatomy, physiology, entomology, parasitology, ecology, cellular biology, and genetics, or research in these fields. Excess coursework in aquatic subjects may be used to meet this requirement when appropriate or an appropriate combination of education and experience.

Appendix 6. Policies and Procedures (Graduate Regulations) for Graduate Students in Wildlife Biology at UM

GRADUATE PROGRAM IN WILDLIFE BIOLOGY
AT THE UNIVERSITY OF MONTANA
POLICIES AND PROCEDURES FOR GRADUATE STUDENTS
(Approved September 2000 by WBIO faculty – Revised Fall 2018)

I. DESCRIPTION OF PROGRAM
The Wildlife Biology Program (WBIO) at The University of Montana is a joint program of the College of Forestry and Conservation (CFC), the Division of Biological Sciences (DBS), and the Montana Cooperative Wildlife Research Unit. This interdisciplinary makeup provides broad exposure to diverse viewpoints and approaches. The Program is housed within the College of Forestry and Conservation and has a Director (from either DBS or CFC) who reports to the Dean of CFC. Graduate degrees offered through WBIO include the Master of Science in Wildlife Biology (Thesis and Non-thesis Options) and the Doctor of Philosophy in Fish and Wildlife Biology (offered by The University of Montana-Missoula in collaboration with Montana State University-Bozeman).

The graduate program in WBIO emphasizes the theoretical foundations, scientific research techniques, and general biological understanding necessary for graduates to pursue further research or to seek employment as wildlife biologists, managers, administrators, and academicians. Types of research questions addressed in WBIO graduate programs include theoretical and applied aspects of specific species and species groups, biological systems, and socio-political systems as they relate to conservation of wildlife.

Complete applications must include:

A. completed application form (available on-line from the Graduate School;
B. 1 official transcript of all college and university courses;
C. a short statement (1-2 pages) of your interests and goals;
D. a resume detailing work experience from college entry to present;
E. 3 letters of recommendation (submitted separately or through CollegeNet);
E. GRE scores for verbal, quantitative, and analytical;
F. nonrefundable application fee ($60); and
G. Test of English as a Foreign Language (TOEFL) scores (foreign students only)

NOTE: No special application form is required for financial assistance: financial assistance is considered for all acceptable applicants.

Submit application materials to:

Wildlife Biology Program
W. A. Franke College of Forestry and Conservation
The University of Montana
Missoula MT 59812

II. ADMISSION REQUIREMENTS
Application to the Wildlife Biology Program is very competitive and we must turn down many applicants who meet the minimum criteria (below).
THE WILDLIFE BIOLOGY FACULTY SPECIFICALLY WARNS THAT ENROLLMENT IN
GRADUATE NON-DEGREE STATUS DOES NOT PROVIDE FAVORED STATUS TOWARD
ACCEPTANCE TO ANY WILDLIFE BIOLOGY DEGREE PROGRAM.

A. M.S. (Thesis Option). Admission under this option normally requires a bachelor’s degree in
Wildlife Biology or related field. Major course work deficiencies will be made known to the
applicant at the time action is taken on the application. To enter the program without major
deficiencies, the candidate should present the following course work: mathematics (at least an
introductory course in calculus and at least 1 course in statistics); chemistry (at least 1 year of
college chemistry, including organic chemistry); and appropriate course work in biological science
and management/conservation. Knowledge of a foreign language is not required for this degree, but
candidates anticipating a future doctoral program are encouraged to study an appropriate foreign
language.

Preliminary decisions regarding acceptance into the M.S. program are made using the following
criteria:
1. minimum grade point average (GPA) of 3.0 in undergraduate work;
2. Graduate Record Examination (verbal, quantitative, and analytical) is required of all
applicants before admission. GRE scores at the 50th percentile are considered minimums for
students from English speaking countries, and any scores below 50th percentile trigger more
stringent evaluation; and
3. minimum TOEFL score of 92 (Internet-Based Test for applicants from non-English speaking
nations).

Further evaluation is based on letters of recommendation, the applicant’s statement of specific
interests and goals, and a resume detailing work experience from college entry to the present. The
statement of specific interest is used to identify faculty members whose interests most closely match
those of the applicant. The final criterion for accepting an applicant is the explicitly-stated
willingness of a faculty member to serve as Graduate Advisor (“Major Professor”). Under no
conditions are applicants accepted without the agreement of a faculty member to serve as the major
professor. Applicants are therefore encouraged to communicate with potential advisors before
applying.

The Graduate Admissions Committee determines acceptability of applicants based on the above
criteria, and any exceptions to stated minimums must be approved by a vote of the WBIO faculty.
Students must enroll in the semester stated in their acceptance letter.

B. M.S. (Non-thesis option). The non-thesis M.S. Option is available only to established wildlife
professionals who wish to update their qualifications and to students in the Peace Corps Program.
Students who enter the WBIO Graduate Program under the thesis option cannot change to the nonthesis
option. The professional paper is an extensive work relating directly to management issues
the student deals with in a professional capacity. A resource management plan for a region
(historical review, inventory analysis, evaluation of options, action plan, etc.) could be appropriate.
Other aspects of admission requirements are the same as for the M.S. Thesis option.

C. Ph.D. Degree. Most applicants to the Ph.D. program have completed or are completing M.S.
degrees, but students without M.S. degrees are considered if they demonstrate outstanding potential
to complete a Ph.D. program. Successful applicants usually have at least 1 degree in Wildlife
Biology or a closely related field; students with other backgrounds may be accepted depending on
overall potential.

Preliminary decisions regarding acceptance into the Ph.D. program are made using the following
criteria:
1. minimum grade point average (GPA) of 3.0 in undergraduate work and 3.5 in graduate work;
2. Graduate Record Examination (verbal, quantitative, and analytical) is required of all applicants before admission. GRE scores at the 60th percentile are considered minimums for students from English speaking countries, and any scores below 60th percentile trigger more stringent evaluation; and
3. minimum TOEFL score of 92 (Internet-Based Test for applicants from non-English speaking nations).

Further evaluation is based on letters of recommendation, the applicant’s statement of specific interests and goals, and a resume detailing work experience from college entry to the present. The statement of specific interest is used to identify faculty members whose interests most closely match those of the applicant. The final criterion for accepting an applicant is the explicitly-stated willingness of a faculty member to serve as Graduate Advisor (“Major Professor”). Under no conditions are applicants accepted without the agreement of a faculty member to serve as the major professor. Applicants are therefore encouraged to communicate with potential advisors before applying.

The Graduate Admissions Committee determines acceptability of applicants based on the above criteria (any exceptions to stated minimums must be approved by a vote of the WBIO faculty). Students must enroll in the semester stated in their acceptance letter.

III. ADVISORS AND COMMITTEES

The Graduate Advisor and the student will work together closely throughout the student’s tenure. The advisor must approve all proposal and thesis materials before they are circulated to the rest of the committee, and notify the WBIO Office of the time, date, and place of the final examination. The advisor is also responsible for helping the student choose committee members and for helping develop the research topic.

A. M.S. Degrees (Thesis and Non-thesis options). The M.S. Graduate Committee consists of 3 faculty members (the advisor as chair and 2 others), including representatives from both CFC and DBS. Federal employees of the Montana Cooperative Wildlife Research Unit may serve as either DBS or CFC Faculty in this context. In all cases, a majority of committee members must be UM Wildlife Biology faculty members. This Committee assumes the general sponsorship and control of the student's program. Non-UM faculty may serve on the Committee in addition to the 3 UM faculty members when appropriate, but may not vote on committee actions unless they possess Faculty Affiliate or Adjunct Faculty status at The University of Montana.

The Graduate Committee must be assembled by the end of the first semester in residence and must meet by that time to discuss course work. After discussion with the advisor about appropriate committee members, the student is responsible for obtaining verbal commitment to serve from prospective committee members. The advisor will then e-mail a list of the committee members to the Wildlife Biology Office. The Director of the Wildlife Biology Program, after checking to make sure the committee meets the above criteria, forwards it to the Graduate Dean, who notifies the program of the committee’s appointment. Makeup of the committee may change as the research proposal develops, but the Director of Wildlife Biology must be notified of, and approve, any such changes.

Duties of the M.S. Graduate Committee are:
1. Evaluate the schedule of courses presented for the degree;
2. Evaluate the proposal for thesis or professional paper;
3. Insure that all Graduate School requirements are met;
4. Provide direction and supervision for the candidate; 
5. Evaluate the Master's thesis or professional paper and attend related seminars; and 
6. Evaluate the candidate’s performance on the defense.

B. Ph.D. Degree. The Ph.D. Dissertation Committee consists of the major professor as chair and 4
other members. A majority of committee members must be UM Wildlife Biology faculty, with at
least 1 faculty member from DBS and 1 faculty member from CFC. Federal employees of the
Montana Cooperative Wildlife Research Unit may serve as either DBS or CFC Faculty in this
context. Members of the committee must have attained a Ph.D., and any exceptions require approval
by the Director of Wildlife Biology and the Dean of the Graduate School. Non-UM faculty may
serve on the Committee in addition to the UM faculty members, when appropriate, but will not vote
on committee actions unless they possess Faculty Affiliate or Adjunct Faculty status at The
University of Montana. The Dissertation Committee assumes general sponsorship and control of the
student's program.

The Dissertation Committee must be assembled by the end of the first semester in residence, and
must meet by that time to discuss course work and the research statement. After discussion with the
advisor about appropriate committee members, the student is responsible for obtaining verbal
commitment to serve from the prospective committee members. The advisor will then e-mail a list
of the committee members to the Wildlife Biology Office. The Director of the Wildlife Biology
Program, after checking to make sure the committee meets the above criteria, forwards it to the
Graduate Dean, who notifies the program of the committee’s appointment. Makeup of the
Dissertation Committee may change as the research proposal develops, but the Director of Wildlife
Biology must be notified of and approve any such changes. Duties of the Ph.D. committee are the
same as those listed above for the M.S. committee, with the additional requirement of conducting the
written and oral comprehensive exam (see X).

IV. COURSE WORK AND ACADEMIC STANDARDS
All students must be familiar with the requirements and procedures established by the Graduate School
for their particular degree, as published on the Graduate School website, www.umt.edu/grad. Students
on a Research or Teaching Assistantship must register for at least 6 credits each semester during the
academic year. All students must maintain a cumulative grade point average \( \geq 3.0 \). Upon completion of
course requirements, degree candidates must register for at least the minimum number of research or
thesis credits required by the Graduate School (www.umt.edu/grad) each fall and spring semester until
graduation. Some circumstances will require students to register for a different number of credits;
students must consult with their advisor to determine the appropriate number for them. All graduate
students must enroll in WBIO 594, Graduate Seminar, for at least 2 semesters, and must attend during
every semester in residence (see VI-A).

A. M.S. Thesis Option. The minimum requirement for the M.S. Degree, Thesis option, is 30 graduate
semester credits beyond the Bachelor’s degree. Of these, at least 20 must be in formal classes, and
at least half of the course work credits must be at the 500 level or above. Up to 10 of the 30 credits
may be taken as research and/or thesis credits. The majority of course work normally is taken in
WBIO, Biology, and Forestry, but the Graduate Committee may require work in other departments.

A copy of the approved course work outline must be approved prior to the end of the first semester
in residence; it will then be placed in the student’s file in the WBIO office.

B. M.S. Non-thesis Option. Minimum requirement for the M.S. Degree, Non-thesis Option, is 36
graduate semester credits. Of these, at least 29 must be in formal course work and at least half of the
course work credits must be at the 500 level or above. Up to 7 of the 36 credits may be taken as
professional paper credits.
C. Ph.D. Degree. Primary emphasis in the Ph.D. program is on professional development, stimulation of intellectual curiosity, and competency in science, rather than on a specified set of courses. However, certain course work requirements must be completed successfully:
1. the Ph.D. student must obtain a minimum of 60 graduate semester credits beyond the bachelor’s degree. A dissertation committee may require more, depending on the student’s background for the proposed dissertation research program;
2. of the 60 semester credits, 20 may be thesis credits;
3. of the remaining 40 credits, at least 20 must be numbered > 500;
4. at least 30 semester graduate credits must be taken at UM;
5. up to 30 semester masters degree credits, 10 of which may be for thesis, research, or independent study courses, may be applied to the 60 credit requirement;

Required course work is geared toward preparing the student to develop sound scientific knowledge and to facilitate the incorporation of that knowledge into conservation practice. Hence, required course work may include aspects of theory, applications, biology and ecology, socio-political aspects of conservation, and statistical and other quantitative methods. The course work package is developed, in consultation with the Dissertation Committee, to assist the student in planning, conducting, and writing the dissertation.

A course work outline must be approved by the dissertation committee prior to the end of the first year in residence. A brief statement followed by the signatures of the committee members will serve as evidence of committee approval. The committee and student may make reasonable amendments to the course work outline if later evaluation shows that further course work is needed. Copies of the approved course work outline and approval are placed in the student’s file in the WBIO office.

The WBIO Ph.D. Program has no foreign language requirement, but the Graduate Committee may require competence in a foreign language when appropriate for the student’s area of research.

V. CONTINUOUS REGISTRATION, LEAVES OF ABSENCE AND TENURE
The Graduate School requires that graduate students register for credits every fall and spring semester. The number of credits should be that deemed commensurate with use of facilities and faculty time, but is at least 3 credits per semester (6 for students on Teaching or Research Assistantships). Students must apply for a leave-of-absence if they do not plan to be continuously registered. Students who do not register for at least 3 credits per semester for 2 or more semesters without such approval will be dropped from the program by the Graduate School. Re-admission is allowed through petition only.

Maximum time limits allowed for completion of degrees are set at 5 years for M.S. and 7 years for Ph.D. programs by the Graduate School and the Wildlife Biology Program. Students may petition, with support of their committee, for a 1-TIME, 1-year extension, although granting of the petition is not guaranteed. A 6-month extension will be granted for petitions based on issues covered under the family medical leave act. Petitions for extensions must provide careful justification for not finishing in the already-generous time limit and MUST provide a specific timeline of thesis/dissertation chapter completion dates in the extension period. These timelines must be met to continue in the program. Petitions for extensions must first be approved by the student’s graduate committee and then will require a vote by the Wildlife Biology Program faculty who may not agree with the committee. No further extensions are allowed and if the student does not finish, they will be dropped from the program. Such students can re-apply to the Wildlife Biology Program through the Graduate School, but may be faced with new degree requirements. No student is eligible for further TA support, programmatic scholarships or awards after reaching maximum time limits.

VI. WILDLIFE BIOLOGY GRADUATE SEMINAR SERIES (WILD 594)

A. Purpose and Participation. The purpose of WILD 594 is to encourage the regular (weekly)
exchange of scientific ideas among Wildlife Biology faculty and students and to promote improved communication skills. All graduate students must enroll for at least 2 semesters of WILD 594 and attend during every semester they are in residence. A few class meetings each year will focus specifically on improving the skills needed for presenting quality seminars, and students and faculty will present seminars during the remaining meetings. Seminar attendance is mandatory when enrolled.

**B. Timing of Seminars.** Both M.S. and Ph.D. students must present both a proposal seminar and a thesis or dissertation seminar. The maximum time allowed for each seminar is 40 minutes (enforced) to allow ample time for questions and discussion.

The proposal seminar should be presented early in the student’s development of the thesis or dissertation topic (see XIII for details on timeline). Although it must be done absolutely no later than the time that the student’s committee approves the proposal (i.e. proposal approval is contingent on a completed public proposal seminar), students are encouraged to present the proposal early enough to facilitate input to development of the proposal.

The proposal and thesis or dissertation defense seminars are usually presented on the same day as the student’s defense with the committee, but may be presented up to 2 weeks prior to the defense.

For both seminars, students should note that prior planning is important. Scheduling seminars will prioritize thesis and dissertation defenses over other types; cancellations are strongly discouraged and must be approved by the student’s committee. Ph.D. students are required to present a seminar once every 2 years during their residence.

**VII. RESEARCH PLANNING AND PROPOSALS**

**A. Research Statement.** As soon as possible after the graduate committee is formed, students must prepare a statement that generally describes their research projects and preliminary ideas and questions. The student must then arrange a formal committee meeting, no later than the end of the first semester in residence. At this meeting, committee members will evaluate the research statement and the proposed course work outline, provide feedback, and either approve them or recommend modifications.

**B. Research Proposal.** Each student is required to complete a formal research proposal that presents the conceptual and empirical framework within which the study will be conducted. The proposal should consist of a title, an introduction to the research problem, an explanation of how the problem fits into a broader conceptual framework defined by existing literature, a justification of its importance, the specific objectives, methods (including details about design and proposed methods of analysis), a timetable, and a budget.

M.S. candidates must defend their thesis proposal in a committee meeting and receive committee approval of their proposal by the end of their second semester in residence and prior to collecting data for their thesis research. Students who will begin collecting data for their thesis research after 1 semester of enrollment must defend their thesis proposal in a committee meeting and receive committee approval of their proposal by the end of their first semester in residence and prior to collecting data for their thesis research.

Doctoral students must obtain committee approval of a preliminary research proposal. The preliminary proposal builds on the research statement, providing more detail on concepts, questions, study design, and data. Its purpose is to demonstrate progress toward a full Ph.D. proposal. Committee approval must be obtained no later than the end of their second semester in residence and
prior to collecting data for their dissertation research. Students must defend their full proposal in a committee meeting by the end of their third semester in residence and receive final committee approval of the proposal no later than the end of their fourth semester. Students who will begin collecting data for their dissertation research after 1 semester of enrollment (e.g., students who begin in the spring semester and will conduct fieldwork the following summer) must get approval of the preliminary research proposal by the end of that semester, prior to collecting data. Such students must defend their dissertation proposal in a committee meeting by the end of their third semester and receive final committee approval of their proposal no later than the end their fourth semester. In the case of students that convert from a M.S. to Ph.D. program before completing the M.S., the dissertation proposal must be defended to the committee by the end of their fifth semester in residence and receive final committee approval no later than the end of their sixth semester. We suggest that Ph.D. proposals be structured in the format of an NSF Dissertation Improvement Grant.

Both M.S. and doctoral students must present a formal and detailed public presentation on their thesis or dissertation proposals. This presentation will be given during a regularly scheduled WBIO graduate seminar time slot (see VI-B). Following this presentation, students will meet with their committee for the oral defense of their proposal. After approval by the committee, a committeesigned copy of the proposal (including a statement that the proposal seminar was successfully completed) must be placed in the student's file in the WBIO office. Doctoral students must also submit an advisor-signed copy, timeline included, to the Dean of the Graduate School (see www.umt.edu/grad/).

In approving the proposal, the advisory committee agrees that successful completion of the proposed research will likely result in a satisfactory thesis or dissertation. Any substantive changes made after committee approval must be brought back to the committee for discussion, and documented as a revised and signed proposal in the student’s WBIO file. All graduate students are encouraged to meet with all of their committee members at least annually to keep them informed of progress.

VIII. TEACHING REQUIREMENT AND TEACHING ASSISTANTSHIPS

All Ph.D. students, including those whose primary support is an RA, must engage in supervised teaching activities and must teach the equivalent of a regular TA assignment for at least 2 semesters. Non-UM teaching experience will be considered for substitution for the teaching requirement. Each semester that a student is a TA, they must ensure that the Professor for the course prepares a teaching evaluation (see under Annual Review of Student Progress below) and submits it to the Wildlife Biology office, with a copy to the major professor (advisor).

Teaching assistantships are awarded annually on a competitive basis; students with a cumulative GPA ≤ 3.0 will receive lowest priority for teaching assistantships. Initial support is contingent upon the nature and quality of completed course work, GRE scores, letters of recommendation, and other evidence of scholarship filed with the student's application for admission. Renewed support is contingent upon satisfactory progress toward degree requirements and quality of teaching performance. An individual graduate student may not receive more than 4 semesters of support on a Teaching Assistantship.

IX. ANNUAL REVIEW OF STUDENT PROGRESS

Students are required to maintain a cumulative GPA ≥ 3.0 and to complete certain tasks by specified deadlines. The WBIO Student Evaluation Committee and the full faculty evaluate student GPA and progress every spring based on a form completed by the student and major professor by April 1 every year (see Appendix). Any deficiencies are identified and the student is placed on probation and given 1 semester to rectify these deficiencies. The Student Evaluation Committee will conduct a follow-up
evaluation by 1 December to determine whether students have rectified deficiencies. Students on probation who do not fulfill requirements in the following semester will then become ineligible for TA or RA support in the next semester. A formal meeting of the student’s committee will then be held to determine whether additional conditions need to be set (e.g., discontinuation of field work until deficiency is corrected). If deficiencies are still not rectified by the end of the second semester after being identified, the student will be dropped from the program.

Each semester the student is a TA, the student is responsible for having the professor in charge of the class submit to the WBIO office (with a copy to the major professor), a short evaluation that ranks the student from 1 (poor) to 5 (excellent), with any comments appended as desired on the following 6 criteria:
1) Preparedness/organized?
2) Positive interaction with students
3) Independent creativity in teaching
4) Enthusiasm
5) Student evaluations
6) Overall assessment

Note that the major professor must sign the form. If the student is on an RA, the professor in charge of the RA must attach a brief evaluation statement.

X. COMPREHENSIVE EXAMINATION GUIDELINES (Ph.D. Students Only)

The comprehensive exam will be completed by the end of the doctoral student’s 4th semester. In the case of students that convert from a M.S. to Ph.D. program before completing the M.S., the comprehensive exam must be completed before the end of the sixth semester.

1) At least 1 month before the beginning of the exam, the student must:
   a) provide a copy of these regulations to all examination committee members
   b) convene a committee meeting at which an examination committee chair is selected and examination topics are discussed. The comprehensive examination committee chair is normally a member of the Wildlife Biology faculty and the student’s committee, but not the student’s major professor.

2) At least 2 days before the beginning of the exam, the examination committee must meet to approve the examination. Given the diversity of faculty in the Wildlife Biology Program, a formal meeting is required to ensure consistency in application of the examination to different students. The student will be informed as to how the examination will be administered.

3) The written portion of the comprehensive examination will consist of up to 8 hours of open and/or closed book questions from each committee member, at the discretion of each committee member, typically answered by the student over 5 consecutive days. At least 1 committee member will ask biologically oriented questions and at least 1 committee member will ask policy- or management oriented questions. Most wildlife conservation and management involves biology as well as social/political/legal/economic aspects; the intent here is to ensure that doctoral candidates have been exposed to and have knowledge in both.

4) At least 3 (and no more than 10) calendar days after completion of the written examination, faculty will communicate to the examination chair their evaluation of the student’s answers. The rating will be 1 of the following:
   a) Pass –Student progresses to the oral exam.
   b) Marginal – The examination demonstrates weakness in 1 or more areas. The committee will meet to discuss the next step, but it may require some or all of the exam to be re-written and may
postpone for a reasonable time the oral examination.

c) Fail – A complete fail of the written exam will require termination of the student’s program.

5) The oral examination explores in depth the areas presented in the written questions, but is not restricted to those areas. The oral examination is restricted to 3 hours in length. The examination is open to all members of the faculty of The University of Montana, though all except committee members are excused before the vote.

6) Normally, the vote for admission to candidacy will occur at the end of the oral examination. Each examination committee member will rate the student’s performance across both portions of the examination in 1 of 3 categories:

   a) Pass – No further work is necessary. Student progresses to candidacy.

   b) Conditional pass – The examination demonstrates weakness in 1 area. The student is required to make up for this deficiency before progressing to candidacy. At the examination, the comprehensive examination committee will specify the tasks required for the student to progress to candidacy, and the criteria for evaluating their completion. Typically, students in this category are required to take an additional course or complete additional written work.

   c) Fail – The examination may be rescheduled if the student fails, but the Comprehensive Exam Committee retains the right to recommend termination of the student’s program upon majority opinion at any time.

After each committee member states their opinion, the committee discusses the vote. At least 75% must vote in favor of a “Pass” or “Conditional pass” or the student has failed the exam.

XI. ADMISSION TO CANDIDACY

At least 6 months before the M.S. or Ph.D. degree is awarded, and after successful completion of the comprehensive exam (for Ph.D. students), the student must submit to the Graduate School 1 copy of the Application for Graduation Form (available from http://www.umt.edu/grad/ or the Wildlife Biology Office). One copy must also be submitted to the WBIO Office.

XII. COMPLETION AND DEFENSE OF M.S. THESIS OR Ph.D. DISSERTATION

A. Content. The thesis or dissertation must embody the results of independent research by the candidate. It must be an original contribution to knowledge, appropriate for publication in peer-reviewed journals. Many WBIO students write their thesis or dissertation as a series of papers, and some submit such papers to journals before graduating. A paper that is accepted by a journal does not, however, automatically constitute acceptance by the committee for the thesis/dissertation. We strongly encourage students to receive approval for manuscripts from their committees prior to submission to journals.

B. Deadlines and approvals. Copies of the dissertation or thesis draft (edited and approved by the advisor as being ready for defense) are provided to the rest of the committee, and a meeting for all committee members is scheduled for a vote on approval no less than 10 calendar days after the committee received the draft. These important steps cannot be circumvented by having the student visit faculty to collect signatures individually. After the committee unanimously approves the thesis for defense, or > 75% of the committee approves the dissertation for defense, the student submits it to the WBIO faculty for their review at least 10 calendar days prior to the defense date, (note: this means that students must provide copies of their dissertation or thesis to their committee at least 20 calendar days before their defense). The signatures of the committee members on the title page of the review copy of the thesis or dissertation indicate that at least 75% of the members of the committee have agreed that it is ready to defend. Students must also provide the Graduate School an
electronic copy of the committee-approved defense draft of the dissertation or thesis prior to their defense date (see www.umt.edu/grad/); the Graduate School reviews this draft for formatting only. Public notice of the defense should be posted 7 calendar days prior to the defense date.

C. Defense. Masters and doctoral students are required to conduct a public 40-minute seminar presentation of the research findings to the advisory committee and any other interested persons followed by a 10-minute question and answer period (see VII-B). This should be done during the WBIO seminar series. The 1 (M.S.) or 2 (Ph.D.) hour defense, which normally occurs immediately following the seminar but may occur up to 2 weeks thereafter, is open to all faculty members of the University. The student is expected to answer questions specific to the research and those of a more general conceptual nature. Additionally, the student is required to “defend” the approach, methods, analysis, and conclusions of their research. Earlier draft thesis copies that were marked by committee members, as well as copies of the proposed final draft, must be brought to the defense for reference. The exam is passed with no committee votes to fail on the M.S. Defense and with no more than 1 committee vote to fail on the Ph.D. Defense. In the case of failure, 1 repeat defense examination is permitted, following a suitable interval as determined by the committee. Students who are unable to finish during the academic year must return the following fall for the defense. No summer defenses are allowed because faculty usually have other summer commitments, and the campus community is generally not available for what is a public defense.

D. Thesis and Dissertation Copies. For guidance in preparing and submitting a thesis or dissertation, as well as deadlines, forms, and procedures required for graduation, students will need to consult the Graduate School website www.umt.edu/grad/. The major professor or the Wildlife Biology Office will submit the final copy of the thesis or dissertation to the Graduate School in an electronic format. The student submits her or his final to the Mansfield Library and must submit a paper copy to be bound or a bound copy of their thesis or dissertation to the Wildlife Biology Office and is encouraged to have an additional copy of the thesis bound by a commercial binding service for the advisor.

XIII. Timeline

<table>
<thead>
<tr>
<th></th>
<th>M.S.</th>
<th>Ph.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committee membership submitted to WBIO Office</td>
<td>By end of 1st semester</td>
<td>Prior to end of second semester, before collecting data for dissertation research (see VII-B); by end of 1st semester when data collection begins after 1 semester of residence.</td>
</tr>
<tr>
<td>Committee-approved coursework to WBIO</td>
<td>By end of 1st semester</td>
<td>Prior to collecting data for dissertation research, by end of 3rd semester.</td>
</tr>
<tr>
<td>Committee-approved research statement</td>
<td>By end of 1st semester</td>
<td></td>
</tr>
<tr>
<td>Committee-approved preliminary proposal</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Research proposal presented orally and successfully defended</td>
<td>Prior to collecting data for thesis research, defended and committee approved by the end of 2nd semester. Where data collection begins after 1 semester, defended and committee approved by the end of the 1st semester.</td>
<td>Prior to collecting data for dissertation research, by end of 3rd semester.</td>
</tr>
</tbody>
</table>
Successful completion of comprehensive exam 4th semester
Application for admission to candidacy 6 months before degree awarded
Committee-approved dissertation proposal By end of 4th semester
Draft thesis or dissertation certified by committee as ready for defense 10 calendar days before defense
Electronic copy of draft thesis to Graduate School Typically ≥ 7 calendar days before defense (check www.umt.edu/grad)
Successful defense Within 5 academic years of start date Within 7 academic years of start date
Submit final electronic copy of thesis or dissertation to Graduate School Typically 4 weeks after the end of semester of successful defense (check www.umt.edu/grad)
Submit final copy of thesis or dissertation electronically to Mansfield Library Typically 4 weeks after the end of semester of successful defense (check www.umt.edu/grad)

Annual Progress Form for Graduate Students in Wildlife Biology – Appendix
[Must be turned in each year to Wildlife Biology Office by April 1]
(Attach full CV)

NAME and EMAIL: ___________________________________ M.S./Ph.D. (Circle one) DATE: __________
CUM. GPA: ________DATE FIRST ENROLLED: ___________________ADVISOR: ________________

I. State whether each of the following has been completed, and if so, the date completed, or the date you plan to complete each item (see regulations):

☐ Enrolled in WILD 594 DATE PLANNED DATE ACCOMPLISHED
☐ Committee submitted to WBIO office
☐ Committee approves course work
☐ Committee approves research plan
☐ Research proposal approved
☐ Committee reviews dissertation proposal (Ph.D. only)
☐ Complete comprehensive exam (Ph.D. only)
☐ Draft certified as ready for defense
☐ Defense

II. Attach a brief evaluation statement(s) from TA/RA professor(s).

Professor that you were a TA/RA (circle one) for last spring semester: ________________________________
Professor that you were a TA/RA (circle one) for last fall semester: __________________________________

☐ Each semester the student is a TA, the professor in charge of the class needs to complete a short evaluation that ranks the student from 1 (poor) to 5 (excellent), with any comments appended as desired on the following 6 criteria. This must be submitted to the Wildlife Biology office, with a copy to the major professor.
1) preparedness/organized?; 2) positive interaction with students; 3) independent creativity in teaching; 4) enthusiasm; 5) student evaluations; and 6) overall assessment

☐ Each semester the student is an RA, the student’s major professor needs to complete a short evaluation.

III. Record the following for work completed SINCE LAST APRIL 15

Publications In Press or published only (give full citation):
Proposals Submitted (list all PI’s in order, amount, and granting organization). Say if funded or not:
Presentations at Conferences or other professional outlets:
Awards for Research Excellence (e.g., best paper, fellowships, etc):
Management/Conservation Impacts of research:
Other Professional Activities (including graduate student service):

IV. A brief statement by the major professor on progress:

SIGNATURE OF BOTH STUDENT AND MAJOR ADVISOR IS REQUIRED

__________________________________   ____________________________________
Student Signature      Advisor Signature
Appendix 7. Graduate-level courses available to graduate students.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>TITLE</th>
<th>INSTRUCTOR(S)</th>
<th>CREDIT(S)</th>
<th>SEMESTER</th>
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<tr>
<td>WILD 594</td>
<td>Graduate Seminar</td>
<td>Robinson/Mitchell</td>
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<td>AUT &amp; SPR</td>
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**Research Design and Communication**

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<th>INSTRUCTOR(S)</th>
<th>CREDIT(S)</th>
<th>SEMESTER</th>
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<tr>
<td>WILD 540/ WILD 541</td>
<td>Research Design and Design R lab</td>
<td>Eby &amp; Hebblewhite/Lukacs</td>
<td>3 &amp; 1</td>
<td>AUT</td>
</tr>
<tr>
<td>WILD 595</td>
<td>Communicating Science</td>
<td>Luis</td>
<td>2</td>
<td>SPR-EVEN</td>
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<tr>
<td>WILD 545</td>
<td>Conducting Strong Inference Science</td>
<td>Martin</td>
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**Conservation and Human Dimensions**

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<tr>
<td>NRSM 574</td>
<td>Human Dimensions of Natural Resources</td>
<td>Metcalf, A. &amp; Metcalf, L.</td>
<td>3</td>
<td>AUT</td>
</tr>
<tr>
<td>NRSM 500</td>
<td>Conservation Social Science Methods</td>
<td>Borrie</td>
<td>3</td>
<td>AUT</td>
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<tr>
<td>BIOB 452</td>
<td>Conservation Ecology</td>
<td>Luikart</td>
<td>3</td>
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**Ecology and Population Biology**

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<tr>
<th>CLASS</th>
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<th>INSTRUCTOR(S)</th>
<th>CREDIT(S)</th>
<th>SEMESTER</th>
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<tbody>
<tr>
<td>WILD 470</td>
<td>Conservation of Wildlife Populations</td>
<td>Luis &amp; Lukacs</td>
<td>4</td>
<td>AUT &amp; SPR</td>
</tr>
<tr>
<td>BIOM 460</td>
<td>Ecology of Infectious Diseases</td>
<td>Luis</td>
<td>3</td>
<td>SPR</td>
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<tr>
<td>WILD 595</td>
<td>Integrated Population Modeling</td>
<td>Lukacs</td>
<td>3</td>
<td>AUT-ODD</td>
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<td>Landscape Ecology</td>
<td>Dobrowski</td>
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<td>BIOB 506</td>
<td>OBEE Core 2 - Ecology</td>
<td>Lowe et al.</td>
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<td>BIOS 532</td>
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<td>Kimball</td>
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<td>Ecological Models and Data</td>
<td>Robert Hall</td>
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**Evolution and Genetics**

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<td>Population Genetics Seminar</td>
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<td>OBEE Core 1 Evol and Genetics</td>
<td>Good et al.</td>
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<td>BIOL 595</td>
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<td>Fishman &amp; Good or Miller &amp; McCutcheon</td>
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<td>Programming for Genomics</td>
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**BIOL 483** Polygenetics & Evolution  
Miller  
3  
SPR-ODD

**ST: BIOB 595** Online: Landscape Genetics  
Erin Landguth  
3  
SPR - EVEN

**BIOL 505 - OBE Core Course - Genetics and Evolution. 4 Credits.**
Offered every other autumn. Prereq., graduate standing. Exploration of the fundamental concepts and approaches in evolutionary biology, functional biology and evolutionary genetics with evolutionary ecology woven throughout. Lectures and discussions, with an emphasis on primary literature, classic and contemporary. Level: Graduate

**BIOL 506 - OBE Core Course - Ecology. 4 Credits.**
Offered alternate years. Prereq., graduate standing. Broad overview of population and community ecology. Lectures and discussions, introducing theoretic foundations and exploring classic and more recent empirical tests of ecological theory with relevant topics in evolutionary ecology and functional biology woven throughout. Level: Graduate

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<td>Applied Linear Models</td>
<td>Instructor</td>
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<td>Applied Multivariate Statistical Analysis</td>
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<td>AUT-EVEN</td>
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<td>Markov Chain / Monte Carlo methods</td>
<td>Bardsley</td>
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<td>Sampling Methods</td>
<td>Affleck</td>
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<td>Applied Statistic Models for Ecology</td>
<td>Dobrowski &amp; Affleck</td>
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Current Catalog...

**STAT 421 - Probability Theory. 3 Credits.**
Offered autumn. Prereq., M 273 or consent of instructor (STAT 341 recommended). Fundamentals of probability; discrete and continuous random variables; expected value; variance; joint, marginal, and conditional distributions; conditional expectations; applications; simulation; central limit theorem; order statistics. Level: Undergraduate-Graduate

**STAT 422 - Mathematical Statistics. 3 Credits.**
Offered spring. Prereq., STAT 421. Introduction to the theory of point estimation, interval estimation, and hypothesis testing. Level: Undergraduate-Graduate

**STAT 542 - Applied Linear Models. 3 Credits.**
Offered autumn even-numbered years. Prereq., STAT 422 or consent of instr. Numerical and graphical data summaries, simple linear and multiple regression and analysis of variance, including estimation, hypothesis testing, residual analysis, diagnostics, and model-building strategies. Use of the computer and real data sets integrated throughout. Level: Graduate

**STAT 543 - Applied Multivariate Statistical Analysis. 4 Credits.**
Offered spring even-numbered years. Prereq., STAT 452 or STAT 422, or consent of instr. Introduction to multivariate statistical methods and applications. Includes appropriate linear algebra, random vectors, multivariate normal distribution, multivariate ANOVA, principal components, clustering, discriminant analysis, and related topics. Use of the computer and real data sets integrated throughout. Intended for students in mathematics and in other fields. Level: Graduate

**STAT 544 - Topics in Probability and Statistics. 3 Credits.**

*(R-12)* Offered intermittently. Prereq., STAT 422 and consent of instr. May include theory of nonparametric statistics, generalized linear models, stochastic processes or other topics chosen by the instructor. Level: Graduate

**STAT 451 - Statistical Methods I. 3 Credits.**

Offered autumn. Prereq., one year of college mathematics including M 115 or equiv. course in probability or consent of instr. May not be counted toward a major in mathematics, except toward the mathematics education concentration. Intended primarily for non-mathematics majors who will be analyzing data. Graphical and numerical summaries of data, elementary sampling, designing experiments, probability as a model for random phenomena and as a tool for making statistical inferences, random variables, basic ideas of inference and hypothesis testing. Level: Undergraduate-Graduate

**STAT 452 - Statistical Methods II. 3 Credits.**

Offered spring. Prereq., STAT 451. Continuation of STAT 451. Multiple regression, experimental design, analysis of variance, other statistical models. Level: Undergraduate-Graduate

**STAT 457 - Computer Data Analysis I. 1 Credit.**

Offered autumn. Coreq., STAT 451 or consent of instr. An introduction to software for doing statistical analyses. Intended primarily for students in STAT 451. Level: Undergraduate-Graduate

**STAT 458 - Computer Data Analysis II. 1 Credit.**

Offered spring. Coreq., STAT 452 or consent of instr. Continuation of STAT 457. Intended primarily for students in STAT 452. Level: Undergraduate-Graduate

**STAT 549 - Applied Sampling. 3 Credits.**

Offered autumn even-numbered years. Theory and application of methods for selecting samples from populations in order to efficiently estimate parameters of interest. Includes simple random, systematic, cluster, stratified, multistage, line transect, distance and adaptive sampling. Use of the computer and real data sets integrated throughout. Intended for students in mathematics and in other fields. Level: Graduate

**M 445 - Statistical, Dynamical, and Computational Modeling. 4 Credits.**

Offered autumn odd-numbered years. Prereq., consent of instr. An interdisciplinary course on the integration of statistical and dynamical models with applications to biological problems. Linear and nonlinear models, estimation, systems of ordinary differential equations, numerical integration, bootstrapping, MCMC methods. Intended both for students in mathematics and the natural sciences. Level: Undergraduate-Graduate

**M 461 - Data Science Analytics. 3 Credits.**

Offered autumn. Prereq., STAT 341, and one of M 221 or M 273, or consent of instructor. This is a methods course supporting the Big Data Certificate Program. The course provides the students with the essential tools of data analytics. The content consists of data dictionaries and data mappings, distributed computing, and related methods. Other topics may include data visualization, regression, and cluster analysis. This course may be used to satisfy the course requirements of the Big Data Certificate Program. Level: Undergraduate. Co-convenes with M 561.
University of Montana Wildlife Biology Program

Program Review Self Study

Part A. Program Description

Overview: The Wildlife Biology Program (WBIO) at University of Montana (UM) is an interdisciplinary program comprised of faculty from the W.A. Franke College of Forestry and Conservation (FCFC), the Division of Biological Sciences (DBS) within the College of Humanities and Sciences (CHS), and the Montana Wildlife Cooperative Wildlife Research Unit (MWCRU) within the Office of the Vice President of Research and Creative Scholarship. WBIO was ranked the number one wildlife biology program in North America by Academic Analytics in 2016. The ranking was based on faculty research productivity and accomplishments; the specific metrics evaluated were: 1) numbers of peer-reviewed journal publications, 2) citation rates, 3) grant dollars secured, and 4) prominent awards received. We do not have access to our current ranking because UM is not presently a client of Academic Analytics. However, since 2016, our faculty has remained whole and enhanced its research productivity, suggesting our program remains a top-ranked program in North America.

While our faculty excel as researchers, they equally excel as educators. All faculty in our program teach classes unless they are on sabbatical or on a temporary “buy-out”. Faculty integrate research into their teaching and prioritize experiential learning. A typical teaching load is 6-9 course credits per year in addition to overseeing a host of experiential learning credits (i.e., internship, independent study, senior thesis, and graduate research and thesis credits). Thus, a key strength of our program is the effective integration of teaching and research to provide undergraduate and graduate students an extremely high quality education that effectively prepares them for post-graduate education and professional careers. Our emphasis on experiential learning necessitates that faculty frequently have one-on-one interactions with undergraduate students, which is noteworthy considering students desire such interactions as part of their undergraduate experience.

An additional strength of our WBIO Program is that we conduct research on the most significant and pressing conservation challenges confronting society. Our research and outreach directly supports the work of state and federal governmental agencies, non-governmental organizations (NGOs), and private entities who directly manage and conserve wildlife in North America and around the world. Finally, our WBIO Program has a strong donor development program that generates considerable private donations to support students, faculty, and the program’s day-to-day operations. We recently hired a full-time WBIO Director of Development in collaboration with the UM Foundation, which should enable us to continue securing private funding to support students and faculty.

Looking to the future, WBIO is well-positioned to build on its strengths in several key areas. First, WBIO is making concrete strides to enhance ethnic and cultural diversity within the program. WBIO already attracts students from diverse backgrounds and regions. During the past three years, students have come to UM to study wildlife biology from 44 states and nine countries. However, our faculty has made it a priority to further diversify our student body with an emphasis on creating additional graduate education opportunities for Native Americans. We recently accepted three Native American students from Salish-Kootenai College into our WBIO graduate program at the Master’s level for Fall 2019. Second, WBIO is well-positioned to strengthen its standing as a national or global leader in the following key areas: 1) conservation genetics, 2) quantitative sciences, with an emphasis on population and habitat modeling, and 3) private lands, partner-based conservation. Faculty within WBIO have distinguished themselves as leaders in each of these areas and their work is expanding.

While WBIO is in a strong position with an optimistic outlook for the future, the Program faces several key challenges and constraints. First, the Program lost its administrative associate in December 2017 following a voluntary severance offer (VSO).
made available to all UM staff. None of the positions that were vacated as a result of the VSO were allowed to be backfilled, regardless of demonstrated need. This has created a significant challenge for the WBIO program. WBIO’s administrative associate provided broad administrative support for the program director, faculty, and students, and also provided administrative support for the graduate program. In result, the program director and faculty have had to absorb significant administrative responsibilities. The most significant concern, however, has been the lack of administrative support for operation of the WBIO graduate program. Responsibilities have been reassigned to four different staff members within the Franke College of Forestry and Conservation, which hasn’t adequately met student or faculty needs. A change will be needed to sustain a strong WBIO graduate program at UM. Second, the WBIO Program no longer has an operating budget, relying exclusively on private philanthropy to operate the Program. Lack of operational funding has greatly restricted the Program’s ability to meet needs of faculty and students and to make strategic investments for the future. Third, UM presently has less grant and accounting staff support in the Office of Research and Sponsored Programs (ORSP) than in the past, which has had a significant, negative impact on faculty and graduate students who depend on that support given high research grant activity. The insufficient post-award grant support has likewise frustrated grantors and compromised research funding. A fourth, related challenge is excessive faculty workload. Over the past five years, UM has been forced to reduce staffing and not backfill key positions in response to overall declines in enrollment. Most faculty have been asked to take on additional administrative and teaching responsibilities while attempting to sustain large research programs that are critically important to the continued success of the Program. This challenge is not unique to WBIO at UM, but it is especially acute within WBIO because the program has not experienced enrollment declines as other units have. Finally, office and lab space is insufficient to support the current size of the Program.

Developments and Trends in the Discipline: A host of indicators suggest that the wildlife biology field will place an increased emphasis on diversity, equity, and inclusion (DEI) in the coming years. Department Heads/Directors/Chairs in WBIO programs at universities across the nation have identified DEI as a key priority. Similarly, wildlife agency administrators have begun focusing on the profession’s relevance to society and linking relevancy efforts to DEI. As indicated above, our WBIO Program at UM is placing an increased emphasis on DEI as we move into the future. We recognize the importance of our role in attracting and educating the next generation of wildlife professionals who will become the future applicant pools for agencies, NGOs, and private entities.

Climate change and sustainability, while not a new development, will undoubtedly become increasingly important in future years. Climate change is now fundamental to every aspect of natural resource and environmental management, including fish and wildlife. Our faculty are currently conducting a host of research projects focused on climate change and species capacity to adapt and will continue to prioritize this research in the coming years. Results of this research will undoubtedly be of critical importance in the future as society is forced to make difficult decisions in response to a changing climate. More generally, UM as an institution is moving in this direction as well. Examples include the creation of an Associate Vice President of Research for Global Change and Sustainability in 2016 and the identification of “Environment and Sustainability” as one of UM’s six “Communities of Excellence”.

Partner-based conservation on private lands is also likely to become increasingly important in the years ahead because private lands are fundamentally important to wildlife conservation and management. The wildlife biology discipline has made significant headway in working collaboratively with landowners to achieve conservation goals, but there is need to place a higher priority on these efforts going forward. The need pertains to both education and research. Several of our faculty are working closely with various landowner partnerships and exploring opportunities to more directly incorporate partner-based conservation into our curriculum. A number of employers have made explicit requests in recent months to UM to expand this type of educational training for students so they are better prepared for jobs that require close working relationships with landowners.

Expanding on the above discussion, we anticipate an increased emphasis on interdisciplinary work in the future. The challenges facing fish and wildlife must be solved with broad-based collaborations that incorporate expertise and experience
from multiple fields and engagement with diverse stakeholders and decision bodies. WBIO at UM has been formally structured as an interdisciplinary program for decades and is extremely well positioned to meet the need for greater interdisciplinary work in the future. Beyond the existing interdisciplinary structure, WBIO faculty presently have collaborations in place with Journalism, Business, Law, and Environmental Studies at UM.

Our Program believes it is well-positioned to respond to recent developments in the field and to maintain our standing as one of the top wildlife biology programs in the nation. We have a strong reputation for educating students well and preparing them for advanced education and professional careers. Our research productivity speaks for itself. Our primary concern for meeting these challenges is resource constraints, which could limit our Program’s ability to respond as effectively as other programs that have the potential to invest resources into new initiatives.

**Decision and Finance Structures:** The WBIO Program makes decisions as an interdisciplinary faculty through two primary structures: 1) weekly faculty meetings, and 2) committees (Undergraduate, Graduate Admissions, and Graduate Evaluations). Committees are authorized to make various decisions pertaining to the undergraduate and graduate programs on behalf of the faculty. Similarly, the Program Director is granted some decision space tied to the routine operation of the Program. All other decisions are made by the entire faculty. Certain higher-level decisions are made or considered by the Wildlife Advisory Group (WAG), which comprises the Dean of the Franke College of Forestry and Conservation, the Associate Dean of the Division of Biological Sciences, the Leader of the Montana Cooperative Wildlife Research Unit, and the Director of WBIO. Decision space for the WBIO Program is restricted to operation of its degree programs (BS and MS in Wildlife Biology and PhD in Fish and Wildlife Biology). Decisions pertaining to faculty evaluation, salary, merits, and promotion fall to the respective administrative units (Colleges and Departments) represented in the Program. Similarly, higher-level administrative decisions pertaining to the respective units are made by the leadership of those units. Those decisions frequently influence WBIO, and therefore, input from the WBIO Director and Faculty is typically welcomed.

As noted above, WBIO no longer has an operational budget, which is a significant limitation. The Program’s operation is dependent on private gifts to its unrestricted UM Foundation account. The Program has a host of other Foundation accounts, most of which are for student scholarships and fellowships. Roughly half of the accounts are endowed. Additionally, WBIO has two endowed professorships (Boone and Crockett Professor of Wildlife Conservation and John J. Craighead Professor of Wildlife Conservation). The Boone and Crockett Professorship has several associated research endowments. We are presently fundraising for a research endowment for the Craighead Chair.

Faculty secure significant grant funding to support graduate education and research. During the past 3 years, WBIO faculty secured roughly $66 M in grant funding. A significant portion of those grant dollars come from state and federal management agencies, which frequently pay minimal or no overhead. Most IDC is retained centrally in the Office of the Vice President of Research and Scholarship, with relatively small percentages returned to the respective administrative units and individual faculty members.

Salaries for faculty and staff are provided centrally through the respective administrative units (FCFC, DBS, and MWCRU). WBIO additionally receives 21 semesters of teaching assistantships (TAs) which are allocated annually to graduate students to help support graduate education while meeting faculty TA needs within the Program. Roughly half of the TAs are allocated to classes with WILD prefixes and half to classes with BIO prefixes. WILD classes are administratively tied to FCFC while BIO classes are tied to DBS. Finally, WBIO receives course fees paid by students to cover class field trips, laboratory exercises, and other needs directly associated with teaching.

**Part B: Quality and Support**

**Undergraduate Program**
**Strengths and Weaknesses:** A major strength of our undergraduate program is our integration of research into the educational process. Students are taught by professors who incorporate the latest advances in science, research, and technology into their course curricula. Additionally, faculty and graduate students create opportunities for undergraduates to gain hands-on experiences by assisting with research projects. All undergraduates are required to complete at least two credits of experiential learning. Most commonly, students meet this requirement by completing a summer internship or job in the wildlife field. Once the field portion of the internship is completed, students then write a science-oriented paper tied to their internship under the guidance of their assigned faculty mentor. Students may also meet the experiential learning requirement by taking a summer field course at Flathead Lake Biological Station (or equivalent). Undergraduates also have the option of pursuing independent studies under the guidance of faculty, which frequently tie to faculty/graduate student research. We also offer students who have performed well academically the opportunity to complete a senior thesis project. Students who pursue a senior thesis assemble a 3 or 4 person faculty committee with a designated faculty chair/mentor. Students write and defend a research proposal, conduct their project, and then write and defend their thesis before their committee. Students are also required to orally present their research. Many students are provided datasets tied to research they’ve done for internships, jobs or independent studies, although some students collect their own data. The primary requirement is that students develop their own research questions and corresponding projects (with guidance from their faculty chairs and committees) such that the work can be published. Many of our students indicate these types of intensive experiential learning experiences are the highlight of their undergraduate education.

A current weakness of our undergraduate program is the lack of a science writing class. Until recently, most WBIIO students met their intermediate writing requirements by taking NRSM 200 (Natural Resource Professional Writing) or WRIT 325 (Honors Science Writing). The salaries for these instructors were covered by FCFC; unfortunately, the College was forced to let these instructors go in 2016 in response to budget cuts. For perspective on this loss, multiple WBIO students expressed that WRIT 325 was the most impactful course they took as an undergraduate at UM. There are no equivalent science or technical writing courses offered at UM, although we are presently exploring options with the Davidson Honors College (DHC) to permanently restore WRIT 325. Written and oral communication skills are frequently identified by employers as the most critical skillset they look for in job applicants when hiring. There is a pronounced difference in writing proficiency between students who have had science writing and those who haven’t. Another current weakness in our curriculum is large class sizes and few sections of key lower division curriculum courses in biology, chemistry, math and statistics. For example, there are only two sections of applied calculus (M 162) and one section of statistics (STAT 216), which leads to scheduling challenges for students. Average class size for an introductory student in wildlife biology has grown to ~250 students. Our program effectively recruits large numbers of students into the program, but many of those students switch majors following their first year. We suspect that large class sizes are impacting retention in the major.

WBIO has taken a number of steps to mitigate these weaknesses. To address the loss of statistics offerings, our WBIIO faculty added a second offering of Honors Biostatistics (WILD 240), which is an approved alternative to STAT 216 for stronger students. This has helped our stronger students but hasn’t addressed the challenge for others. To address larger class sizes, our faculty have incorporated Learning Assistants and “active learning” pedagogy into their classrooms. Learning Assistants are undergraduates who already completed the course and who did well. LAs assist the professor in the classroom during “flipped classroom” sessions where students are challenged to actively explore the subject material through analytical thought processes. We believe incorporation of LAs and active learning approaches have improved quality of instruction, although we remain concerned about exceptionally large class sizes in lower-division STEM courses. We have also tried to mitigate large class sizes in part by offering Wildlife Interest Groups (WILD 170), a 1-credit freshman seminar course with a maximum class size of 25 students. The primary purpose of the course is to help WBIO students develop relationships as they learn about resources on campus and participate in interesting wildlife-oriented exercises. Additionally, our academic advisor schedules incoming WBIO students in the same sections of biology and chemistry labs to further help students more effectively navigate their first semester by working together.
**Program Size/Growth:** Our WBIO Program grew from ~250 undergraduate students in Fall 2009 to ~350 students in Fall 2011 and is presently at ~340 students in the fall. This growth occurred during a period when overall UM enrollment declined significantly. This demonstrates the value of WBIO in attracting students to UM, but it also has led to added workload for faculty, particularly given budget and staffing reductions associated with UM’s declining enrollment. In 2018, UM President Seth Bodnar charged the WBIO Program to grow by another 100 students to help overcome UM’s enrollment declines. Faculty within WBIO went through a structured decision making process during Fall 2018 to identify a plan for growth that would strategically reinvest a portion of increased growth revenue back into the program to help manage the growth (Appendix 8). The plan has been presented to President Bodnar and UM Provost Jon Harbor and was well-received. WBIO is now focused on recruitment and retention strategies to achieve the additional student growth consistent with our growth plan. The plan included an upfront investment in the program to ensure success, but to date, there has been no additional investment in the WBIO program which may hamper efforts to recruit additional students. Importantly, the majority of WBIO students are non-residents, which provides an increased revenue stream per student to the university.

**Alignment with University Strategic Vision:** Our undergraduate program aligns extremely well with UM’s Strategic Vision (see “Alignment with Strategic Opportunities” in Appendix 2). Our high caliber faculty, each of whom blends their research and expertise into their course material, embody the theme: *Support Excellence and Innovation in the Curriculum*. Our heavy emphasis on experiential learning directly *Engages Students Where They Are* while simultaneously *Partnering with Place*. In fact, *Partnering with Place* is key to our Program’s ability to recruit students from across the United States and from other countries. Students are enthralled with the opportunity to study wildlife in western Montana, where ecosystems are still largely intact and most of the native flora and fauna are still present on the landscape. We have excelled as a Program in *Fostering Knowledge Creation and Innovation*, which is the basis for our number one ranking by Academic Analytics. Our faculty and students integrate cutting-edge knowledge with advances in science and technology to provide wildlife biologists and practitioners in the United States and around the world with powerful resources to monitor wildlife populations and habitats. Ultimately, we believe our Program is the embodiment of UM’s Strategic Vision. We believe our website effectively captures our Program’s objectives and learning goals. The website also does a good job communicating to prospective students the opportunities that await them at UM, dovetailing well with UM’s website and strategic vision.

**How the curriculum prepares students:** Our undergraduate curriculum prepares students for advanced education and professional careers by providing them foundational knowledge in biological sciences, organismal biology, math, statistics, ecology, conservation and management, policy, communication, and social science. Our curriculum meets wildlife biologist certification standards set forth by The Wildlife Society and course requirements for fish and wildlife biologist positions, assuming students in the Terrestrial Option take one additional botany class as an elective (which they are advised to do). Beyond formal coursework, our experiential learning requirement ensures that students gain exposure to meaningful, hands-on field experience. Refer to Appendices 1 and 2 for more detail on the curriculum and how it meets essential learning goals.

**Initiatives to enhance student learning and engagement:** As described earlier, we place an emphasis on experiential learning. At a minimum, all students are required to pursue an internship or enroll in an intensive, summer field-based course. Students are additionally provided opportunities to engage in research being conducted by faculty and graduate students. Some positions are volunteer while others are paid. Often, students will gain initial research experience by working as a volunteer for a few hours a week, which often leads to paid positions. Students with a ≥3.5 GPA during their junior year are encouraged to pursue a senior thesis project. Students with a 3.0 – 3.5 GPA may request to do a senior thesis project, which in most cases will be supported. Students with a GPA below 3.0 would not be served well by taking on the additional burden of a senior thesis. The WBIO senior thesis will also meet the thesis requirement for the Davidson Honors College (DHC). Thus, WBIO students enrolled in the DHC are not expected to complete two separate senior thesis/capstone projects. Students who complete senior thesis projects often publish their theses in peer-reviewed journals after they graduate, which gives them a significant advantage when competing for funded graduate research projects. Students who successfully complete a senior thesis project are eligible to graduate with High Honors in WBIO as long as they complete their coursework with a ≥3.7
cumulative GPA (UM GPA standard for High Honors). If students have $\geq 3.7$ GPA but do not do a senior thesis, they may still graduate with High Honors by completing a high honors oral exam. The exam is administered to the student by 3 WBIO faculty members who ask a series of questions testing the student’s ability to think critically and synthesize knowledge from their undergraduate coursework. The oral exam generally lasts 1.5-2 hours and students typically do very well, demonstrating a high level of proficiency (which is not surprising given their high GPAs). Students who finish with a $\geq 3.7$ cumulative GPA but who do not complete a senior thesis project or oral exam are not awarded High Honors.

Beyond formal curricular offerings, students are afforded many opportunities throughout their degree program to engage in educational, extra-curricular activities associated with wildlife through involvement in student chapters of the American Fisheries Society, The Wildlife Society, Backcountry Hunters and Anglers, and several others. As one example, professionals working in the community are frequently invited to present at weekly student organization meetings. As another example, students are given opportunities to participate in varied field opportunities on weekends if they choose. Examples of opportunities include snorkeling, visiting Yellowstone to observe and learn about wolves, participating in wildlife surveys, and participating in fence removal projects, to name a few. Students actively engaged in student organizations are also provided opportunities to attend state, regional, and national professional meetings. These are tremendous opportunities for students to develop professionally and to begin developing their professional networks. Connections from these meetings sometimes lead to funded graduate projects and job offers post-graduation. Students also are given opportunities at these meetings to present results of their undergraduate research in front of professionals working in the field.

Our WBIO undergraduate program also directly benefits from the support of our graduate students. To that end, our WBIO Graduate Student Association has two officer/chair positions focused on undergraduate engagement: an aquatic and a terrestrial undergraduate liaison. These liaisons have been especially valuable in creating enhanced learning opportunities for undergraduates. An impressive example of faculty, graduate students, NGOs, and undergraduates working together to provide enhanced learning is our “Hunting for Sustainability” and “Hunt Mentorship” programs. Our goal with these programs is not to advocate hunting or compel students to hunt, but instead, help students learn more about hunting and angling, which is a key component of the wildlife conservation discipline. Many employers frequently lament that students are disconnected from hunting and angling and therefore less qualified for jobs that require them to work directly with hunters and anglers (key constituents in wildlife conservation). Through these extracurricular activities, students who have never hunted are provided the opportunity to learn about and participate in a host of outdoor activities, eat wild game meat, learn about hunter ethics, learn to use maps for navigation, and accompany experienced hunters on actual hunting trips in the field during hunting season. Some students will elect to participate as hunters themselves under the direction of an experienced hunt mentor, and some have harvested their first animals through this program. A number of students have commented that this program has been life-changing for them.

Our Program is highly satisfied with its efforts to offer students experiential and advanced learning opportunities. The challenge is that it takes considerable time of faculty to provide these experiences, which can be as or more intensive than teaching a course, yet the efforts are not formally recognized as part of faculty workload discussions, or they are given only trivial weighting toward workload. However, we believe these types of experiences reflect our identity as a wildlife biology program, and we are therefore committed to offering them to students. It’s why many of them choose to come to UM over other universities, or decide to pay out-of-state tuition when they could otherwise enroll in a wildlife biology program in their home/resident state for much less cost.

**Advising and retention:** The WBIO Program places a high priority on student advising, and to that end, the Program has its own professional academic advisor for undergraduate students. Difficult decisions were made during budget reductions to retain a professional student advising staff, which led to other staff positions being eliminated. While strategic at the time, the University has recently enlisted the model of professional student advisors and is investing in providing such support to units across campus that lack those positions. To date, WBIO/FCFC have not received central funds for advising staff given our past decision to prioritize student advising (but at the expense of other program needs).
The academic advisor enables the Program to effectively advise large numbers of students, and therefore, is critically important to the undergraduate program. The academic advisor’s role, generally speaking, is to serve as a competent, knowledgeable resource for students on all aspects of their curricular engagement with UM. The advisor enrolls incoming students in classes and helps all students develop and implement 4-year degree plans. The advisor is connected to UM’s professional advising network, which allows her to stay abreast of pertinent information for students, such as information concerning course registration, registration holds, new course offerings, graduation requirements, and campus resources. The advisor position does not eliminate the need for faculty advising/mentoring; in fact, all students are also assigned a faculty mentor. Faculty mentors help students with curricular guidance, experiential learning, professional development, and career guidance. The faculty mentor is formally responsible for mentoring, overseeing, and approving internships and other experiential learning credits. We believe our present approach to advising works well and optimally meets the needs of students. With that said, we occasionally fail to meet a student’s expectations for quality one-on-one experiences. This likely reflects the fact we have >300 undergraduate students and only one academic advisor, and many of our faculty simultaneously mentor students in other undergraduate degree programs (e.g., Biology; Ecosystem Science and Restoration; Parks, Tourism, and Recreation Management; and Resource Conservation). On the whole, students provide very positive feedback on our system for advising and mentoring and especially appreciate the advisor position.

Beyond advising, we connect students with other WBio students shortly after they arrive to UM. We also provide opportunities for them to learn about the wildlife discipline and engage in hands-on activities during their first semester. Our goal is to make them feel part of the wildlife biology community from the outset. One way we do this is by offering a 1-credit course for first-year students titled Wildlife Interest Groups (WILD 170). This course is intended to be synergistic with other freshman seminar classes offered for first year students at UM. We offer multiple sections of the course, with a maximum class size of 25 students. One objective of the course is for students to begin building relationships with other students in their discipline cohort, with whom they will interact closely during their time at UM. A second objective of the course is to introduce students to UM campus resources, from the library and writing center to student organizations to health and wellness services offered by Curry Health. A third objective of the course is for students to learn about academic advising resources and develop a 4-year degree plan in coordination with the academic advisor. The final objective is to introduce students to interesting and engaging wildlife-oriented experiences to excite them about the degree program. In addition to this course, we enroll students in an introductory wildlife biology course (Careers in Wildlife Biology, WILD 180), taught by the WBio Program Director. The WBio Program Director also oversees and helps instruct WILD 170. With this approach, students are immediately provided a direct connection to their degree Program while they are taking other critical, but often challenging introductory courses in biology, chemistry, and math. As already discussed in the section above, WBio puts forth a number of other efforts to meaningfully engage students and provide them a quality educational experience, with the hopes that such efforts will improve retention.

In spite of WBio’s focus on advising and retention, many students do not stay in the program. In recent years, WBio has experienced incoming class sizes of 130-150 new students and yet graduate only ~50-60 students each year. Most students who leave WBio remain at UM, so this isn’t necessarily a problem. Most commonly, students leave the major after experiencing difficulty in first and second year courses in biology, chemistry and math, preferring other natural resource majors with different course requirements. Also, WBio has a minimum 2.5 GPA requirement for graduation, which causes students who are struggling academically to switch to another major where the minimum GPA requirement is 2.0.

**General Education:** WBio’s primary contribution to General Education at UM is through offering WILD 105N (Wildlife and People). This class attracts a large number of non-majors (~60 students). WBio faculty also contribute by teaching technical writing as part of upper division WBio curriculum courses, which allows students to meet UM’s Advanced College Writing requirement. Our Program also offers WILD 240 (Honors Biostatistics) each semester, which contributes toward the “symbolic systems” exception to the Modern and Classical Language Requirement. Finally, some faculty in WBio contribute to other
programs in biology and natural resources, where they teach General Education classes in those disciplines (e.g., courses with BIO and NRSM prefixes).

**Graduate Program: Admissions and Curriculum**

**Strengths and Weaknesses:** The UM Wildlife Biology Program was ranked the top wildlife program in North America by Academic Analytics in 2016 based on faculty research accomplishments (publications, citations, grant dollars, awards). This ranking is a direct reflection of the strength of WBIO’s graduate program. Graduate students conduct research under the mentorship of faculty and are frequently first author on peer-reviewed journal publications. Admission into the graduate program is highly competitive, and therefore, graduate students in WBIO are typically exceptional. Graduate students receive a high-quality education while directly contributing to society through research. Student research advances science and addresses applied problems in wildlife conservation and management. WBIO graduate students are highly supportive of one another and also contribute substantively to the undergraduate program by creating experiential learning opportunities. For these reasons, WBIO’s graduate program is extremely strong and beneficial to society.

The most evident weakness facing the WBIO graduate program is lack of sufficient administrative support and record keeping. WBIO lost its administrative associate in 2017 when UM put forward a voluntary severance offer to reduce staff. One of the key responsibilities of this staff position was to provide administrative support for the WBIO graduate program. Following elimination of the staff position, the graduate program has lacked sufficient support. Basic program administration responsibilities have been picked up by various other staff members in the FCFC who have other full-time jobs. They have allowed the Program to function, but there is clear need for a dedicated administrative assistant. Lack of support has led to the following weaknesses: lack of a single point of contact for WBIO faculty and students, outdated and insufficient tracking of student records, delayed and incomplete responses to prospective students who inquire about the program, reduced administrative support for graduate student travel and purchasing, reduced graduate program visibility, and in general, the inability to implement best management practices. Weaknesses in record-keeping extend well beyond the lack of administrative support, reflecting a broader need at UM for a more robust, centralized graduate degree-tracking system similar to what is in place for undergraduate programs.

**Student Recruitment and Retention and Program Size:** The Wildlife Biology Graduate Program generally only admits students under a “Thesis/Dissertation” option and only if a research and/or teaching assistantship or fellowship is in place to financially support the student. As noted above, admission into the graduate program is highly competitive. Faculty frequently post opportunities for funded graduate projects on job boards, which generate dozens of applications per project. Some advertisements for individual M.S. graduate opportunities have generated more than 100 applications in recent years. Thus, demand for our graduate program far exceeds availability, especially at the M.S. level. Availability is limited by research funding and capacity of faculty to mentor students. Faculty mentoring of graduate students is intensive in WBIO, similar to other STEM fields.

During the past year, we became more intentional about increasing diversity within our program by creating additional graduate opportunities for Native American students. We partnered closely with the Alfred P. Sloan Indigenous Graduate Partnership, UM Administration, and Salish-Kootenai College (SKC) to recruit and admit three Native American students into our graduate program for Autumn 2019. We simultaneously conducted an internal review of our graduate admission procedures. Our purpose was to determine how effective our current admission criteria have been in predicting graduate student success and whether our criteria lead to preferential selection of some ethnicities and cultures over others. In result, we are now considering adoption of a holistic review process for graduate student admission that would include more evaluation criteria and lessen reliance on GRE scores.

We attract high quality students, but we sometimes fail to recruit our top choices. Barriers to attracting the best and most diverse students include low stipends, lack of health benefits, and lack of maternity leave support. Graduate students
represent diverse life stages and backgrounds, many of whom require sufficient financial support and health benefits to justify pursuing and completing a graduate degree, particularly a Ph.D. A number of our graduate students pursuing Ph.D.’s leave professional positions with salaries and health benefits that far exceed what they receive at UM. This can be especially challenging for students with spouses and children to support. Competitive financial support is paramount to effective recruitment and to make graduate education accessible.

Student retention is high in our graduate program, which stems from our highly competitive selection and admission procedures and substantive faculty-student mentoring relationships. On rare occasion, a graduate student fails to complete key program requirements and drops out of the program. Generally speaking, though, retention is a minor concern because admitted students have the capability to successfully complete our degree requirements, and they are provided extensive mentoring from their faculty chairs and graduate committees.

The WBIO Program currently has approximately 60 actively-enrolled graduate students, which represents 40% growth compared to five years ago (Appendix 3), when the faculty count was slightly lower due to retirements and departures. After new faculty were hired, the graduate student count increased, which partially explains the recent growth. There is some opportunity for further growth with additional resources to support research assistantships, but significant growth is limited by the research-intensive nature of Thesis/Dissertation-based graduate degrees. Theoretically, WBIO could grow its graduate program by offering an alternate M.S. degree because there is high demand for graduate education. We have in the past allowed a few students to enroll in a non-thesis M.S. program, but it was geared towards international students working in the wildlife profession who needed advanced coursework. Few wildlife biology programs in the United States actively promote non-thesis graduate degrees in wildlife, which reflects the historical need of wildlife agencies and other employers to hire biologists with advanced training in science and research. However, in recent years, wildlife employers have begun expressing interest in alternate graduate education models in response to changes in the wildlife profession. For example, employers frequently express need for wildlife biologists with more advanced skills in communication, leadership, private lands conservation, conflict resolution, social science, policy, and law, as examples. There may be opportunities in the future to explore an alternate M.S. degree option in WBIO that would better meet the needs of employers and facilitate growth in the graduate program. For example, employers have recently proposed having students complete a Species Status Assessment (SSA) or species management plan in place of a research thesis.

Program Curricula and Research: There is no set curricula for graduate students in WBIO. Instead, students are provided a list of graduate courses that are available and commonly pursued by wildlife biology students (Appendix 2 [See Appendix 9 imbedded within Appendix 2 of this report: “Graduate-level courses available to graduate students”]). Each student then identifies a custom curriculum that best meets her educational needs when considering her previous coursework, thesis/dissertation project, and professional interests. The student’s graduate advisor assists the student in selecting coursework, which is then reviewed and ultimately approved by the student’s graduate committee, most often during the first semester of residence. As noted above, nearly all students in our graduate program must complete a research-based thesis (M.S.) or dissertation (Ph.D.) to earn their degree. Thus, it is typical for roughly one-third of a student’s coursework to comprise research and thesis credits.

Career Preparation: We educate and train graduate students for additional advanced education (e.g., doctoral and post-doctoral positions) and for a diverse array of professional positions with state and federal natural resource agencies, non-governmental organizations, universities, and the private sector. Some students go on to work in research, but many go on to work in non-research positions. Most positions in wildlife biology require applicants who have a strong technical knowledge of wildlife biology and the research process. We prepare students well in that regard. We also place a high priority on teaching students to think critically, which undoubtedly serves them well in their careers. However, as noted above, employers are increasingly expressing desires for applicants with better communication, leadership, and interpersonal skills. Most wildlife professionals hold jobs where they are responsible for implementing conservation actions that have significant sociopolitical and economic implications for the communities where they live and work. Their technical training does not prepare them well
to navigate these challenges. To date, we have assumed students would receive this type of training on-the-job or through other post-graduate training opportunities. Moving forward, it may be worth considering how UM and the WBIO Program could help meet these additional training and education needs that are now desired by employers.

**Advising and Mentoring:** Each graduate student in WBIO has a graduate advisor and committee. The graduate advisor (or occasionally co-advisors) serves as the student’s primary mentor throughout the degree program. The graduate student’s committee members also provide additional mentoring. Each faculty member has a graduate laboratory that is comprised of her set of graduate students. Most graduate labs meet weekly. Thus, graduate students typically receive both individual and small-group mentoring from their advisor throughout their degree program on a routine basis.

**New Student Orientation:** Until last year, WBIO offered only a minimal orientation for new graduate students at the programmatic level. The orientation focused primarily on degree program expectations and a brief overview of staff support and campus resources. WBIO graduate students expressed concerns about the lack of a more robust orientation. Therefore, we held a more in-depth half-day orientation for all new graduate students in August 2018, which was received well. We structured the orientation collaboratively with other graduate programs within the FCFC. The orientation provided students in-depth information about the graduate program, accounting and grant support, library resources and digital access, and various other campus resources. Students also met various faculty in the program, who provided advice for success in graduate school. The orientation ended with a social that allowed incoming graduate students to meet faculty and existing students. We have already planned an identical orientation for 2019 and plan to keep this going into the future.

**Graduate Policies and Procedures:** We have a robust graduate policies and procedures document that is available on our website and provided to all students (Appendix 5). It provides students a clear description of their program and degree requirements and when requirements must be met. We update the document regularly so it is current. All students must submit a report annually in the spring detailing their progress toward their degree requirements. We have a WBIO Graduate Evaluations Committee who evaluates each student’s progress. Students who fail to meet a requirement (e.g., approved research proposal) by the stated deadline are placed on probation. They must rectify the deficiency during the next semester or be subject to dismissal from the program.

**Graduate Teaching Assistants:** WBIO is allocated 21 semesters of TA from the UM Graduate School. TAs are allocated to students each year, where preference is given to existing students who are in need of a TA and who are in good standing (i.e., meeting degree program requirements). All Ph.D. students are required to serve as a TA for two semesters during the course of their program, unless they independently teach a course, in which case one semester may suffice. Generally speaking, TAs assist faculty members in course instruction and help run laboratories. On occasion, however, graduate students (typically Ph.D.) independently instruct lower-division undergraduate courses.

**Program Director:** WBIO has a permanent Program Director (PD) who oversees the program and who is compensated accordingly. The PD is a tenure-track faculty position with a disproportionately high administrative responsibility. The PD also teaches courses and conducts research, but has a lower teaching load and research requirement given his primary administrative role.

**Student Governance:** Student governance exists primarily through the Wildlife Biology Graduate Student Association. Its purpose is to represent the needs, interests, and perspectives of graduate students of the program. Officers include an Administrator, Graduate Seminar Coordinator, Faculty Liaison, Undergraduate Wildlife Liaison, and Undergraduate Fisheries Liaison. The Faculty Liaison represents graduate student interests to the faculty and attends all faculty meetings.

**Graduate Program Collaboration:** The WBIO Graduate Program is comprised of an interdisciplinary group of faculty from the FCFC, the DBS within CHS, and the MWCRU within the Vice President of Research and Creative Scholarship Office. Thus, the program inherently facilitates interdisciplinary collaboration relative to coursework, research, and connections to other graduate degree programs. Some WBIO faculty serve more than one graduate degree program. Additionally, our Ph.D.
program was set up by the Montana University System as a joint degree program with Montana State University. Functionally, however, we collaborate very little with MSU relative to coursework and degree administration. This is likely due in large part to the distance between the campuses (~3 hours apart). The joint Ph.D. degree program is titled “Fish and Wildlife Biology”, whereas our B.S. and M.S. degrees are titled “Wildlife Biology”. The different names regrettably lead to some confusion and at times complicate tracking of students in WBIO.

Use of Co-convened and Undergraduate Courses: As noted earlier, each graduate student has a customized curriculum structured to best meet her needs. For some students, co-convened and undergraduate courses play an important role, particularly in fields such as statistics and math. Graduate students also benefit by helping teach undergraduate courses, which allows them to gain a deeper understanding of the subject matter (Appendix 6).

Graduate Training Performance Assessment: Performance is tracked by evaluating students’ success in coursework, proportion of students completing degree requirements on schedule, graduation rates, numbers of graduate student publications, and post-graduate employment. Performance is qualitatively assessed through routine faculty-student interactions and exit interviews of graduate students.

Post-Graduate Tracking: WBIO students are tracked post-graduation through periodic alumni surveys and sponsored alumni socials at conferences. Each year the WBIO Program Director sends an update letter to all alumni to maintain connections. Perhaps more importantly, it is common for faculty to maintain communication with their graduate students after they leave UM. Some become close professional collaborators. Through these efforts, we’ve learned that our graduate students have nearly 100% job placement rates and many contribute substantively to the wildlife biology field through a variety of professional roles.

Faculty Member Qualifications to Teach: All WBIO faculty were vetted extensively during extremely competitive hiring processes. All faculty have Ph.D. degrees and are considered regional, national or international experts in their disciplines within the broader wildlife biology field. All faculty conduct original science and publish annually. During the past 3 years, individual WBIO faculty members have published an average of 1–14 peer-reviewed journal articles per year. Our Program’s top ranking by Academic Analytics also speaks to the quality of faculty and their qualifications to teach. Additionally, all faculty members undergo extensive performance evaluations; evaluations occur annually for assistant professors, biennially for associate professors, and every three years for full professors.

Faculty: Quality of Instruction

Meeting Teaching Needs: Most courses in WBIO are taught by tenure-track faculty. The typical teaching load is 9 credits/year, reflecting the research-intensive nature of WBIO. Teaching load may be reduced for faculty who are assigned significant administrative roles or who “buy-out” of teaching to accomplish high priority research, outreach, or service. However, some faculty have taught above their required teaching loads to effectively deliver the WBIO curriculum. As noted above, WBIO is an interdisciplinary program comprised of faculty from the FCFC, DBS, and MWCRU. Workload is established by the respective administrative units, and therefore, some variation exists among faculty relative to percent breakdowns in teaching, research, and service, and how teaching credits are accounted. For example, most WBIO faculty have large numbers of contact hours with students through teaching courses, supporting undergraduate experiential learning (i.e., internships and senior thesis projects), and leading graduate labs. The way in which these student contact hours count toward teaching load can vary. Generally speaking, excessive faculty workloads have become a significant issue as WBIO continues to grow in enrollment and research productivity.

Adjunct faculty are occasionally hired to teach courses to backfill teaching responsibilities of tenure-track faculty who are on sabbatical or who have temporary teaching buy-outs (typically one to two classes per semester). Fortunately, during this review period, we have had the opportunity to hire high-caliber adjunct faculty. Most adjuncts have been post-doctoral fellows with germane expertise or faculty from other institutions who are visiting or relocating to Missoula. Graduate students
are occasionally asked to independently teach lower-division courses (typically one to two classes per year), but primarily they support tenure-track faculty in teaching courses.

**New Pedagogies, Practices, and Coursework:** A significant advance in our pedagogy has been the incorporation of active learning into our classes. Faculty who incorporate active learning have restructured how they deliver course content, moving from a traditional lecture format to an integrated lecture-discussion format. Faculty pose questions to their classes that require students to think critically about the subject matter. Students are then asked to discuss their responses or work together to come up with answers (i.e., flipped classroom). Undergraduate Learning Assistants (LAs) who previously took the class are distributed throughout the classroom to help students think through questions and engage in meaningful dialogue and interactions. LAs separately attend an evening seminar once a week with other LAs on campus to learn skills, techniques, and best practices to better support active learning. LAs also meet regularly with their course instructors relative to planning class periods.

Our faculty have also incorporated considerable new technology into the classroom since our last review. Faculty regularly use Moodle to develop and host course websites, which has improved student access to course materials, content, and grades. iClickers, Top Hat, and various other software are now used by a number of faculty to enhance student interaction with course content during class and to complement active learning environments. Classrooms themselves receive regular technology upgrades, providing instructors access to various high-tech resources within the classroom.

In Fall 2019, WBIO made its introductory wildlife course (WILD 180 – Careers in Wildlife Biology) available to Montana high school students as a remote, synchronous course offering. On-campus students are required to physically attend class in the lecture hall and engage in active learning sessions as in past years. Off-campus students “attend” class via Zoom and participate in active learning discussions using Zoom chat rooms. Moving forward, we hope to partner with tribal and other two-year colleges in Montana to make this opportunity available to students at those institutions.

New courses developed in recent years include Fisheries Techniques (WILD 291), Recreation Behavior (PTRM 300), Collaboration in Natural Resource Decision Making (NRSM 379), Advanced Water Policy (NRSM 427), Ecology of Infectious Diseases (BIOM 460), Conservation Genetics (BIOB 480), Hunting for Sustainability (WILD 491), Using R for Biostatistics (BIOB 491/595), Topics in Aquatic Ecology (WILD 568), Human Dimensions of Natural Resources (NRSM 574), Applied Population Genetics (WILD 595), Communicating Science (WILD 595), and Theoretical Ecology (WILD 595/570). At the undergraduate level, some of these courses are listed as approved substitutions for upper division curriculum courses whereas others are available to students only as electives.

**Collaboration with Other Units:** WBIO collaborates extensively with programs in DBS and FCFC in delivering its curriculum. Roughly half of the required curriculum is delivered by these units collectively, reflecting the interdisciplinary nature of WBIO. Additionally, we work closely with chemistry and math/statistics departments. We also collaborate with Davidson Honors College (DHC); WBIO presently has the highest number of students enrolled in DHC. We offer one honors class, Introduction to Biostatistics (WILD 240), which we now offer every semester. A DHC “Teaching, Research, and Mentoring” post-doctoral fellow is presently offering an honors class to our students in Science Writing (WRIT 325), which is extremely valuable. However, we are in need of finding a permanent solution for offering WRIT 325 moving forward (the class was eliminated several years ago due to budget cuts). We hope to find opportunities to further expand our collaboration with DHC in offering our curriculum. We also partner closely with Flathead Lake Biological Station (FLBS) relative to summer field course offerings. Looking down the road, we anticipate there may be future opportunities to partner more closely with Business, Law, and Journalism as we look to meet the evolving needs of employers. Finally, one strength of WBIO at UM is that students can effectively pair dual interests in sciences and the arts. For example, UM presently has students who were drawn to UM because they could major in both WBIO and Dance or Music. It may be wise for WBIO to work more collaboratively with programs in the arts to structure curricular options for students with dual interests that allow them to more efficiently progress through the dual curricula.
**External Teaching:** Several faculty teach workshops/classes to professionals and students external to UM. These classes and workshops can take place through UM’s School for Extended and Lifelong Learning, at professional conferences, or at other universities in the U.S. and abroad.

**Teaching Assessment:** Primary tools used to evaluate quality of teaching are course evaluations and faculty evaluations. Faculty evaluations at UM are accomplished by Faculty Evaluation Committees (FEC) that are comprised of a faculty member’s Departmental peers. During FEC, course evaluations are used to guide a focused discussion of teaching quality with the faculty member being evaluated. When concerns are identified, any number of strategies may be put forward to rectify the situation, depending on what appears to be the root cause of the problem. Examples of remedies include peer mentoring, attending pedagogy trainings, changing course times, re-structuring components of a class, among others. Generally speaking, WBIO faculty have demonstrated an openness to embrace advances in pedagogy in an attempt to continually improve their teaching.

**Faculty: Advising and Mentoring**

**Undergraduate Advising and Mentoring:** WBIO has a full-time professional academic advisor who is responsible for developing and implementing a comprehensive advising program for undergraduate students. Each undergraduate student is also assigned a faculty mentor. The academic advisor meets the myriad technical and day-to-day advising needs of students, whereas faculty mentors assist students with experiential learning (e.g., internships, independent studies, and senior theses), big-picture curriculum questions (e.g., minors, key electives), and career guidance. We believe this approach capitalizes on the different strengths of advisors and faculty and is optimal for students.

The WBIO academic advisor is part of a connected network of all professional advisors at UM, ensuring she is up to speed on the latest advising developments for students. The academic advisor is critical to student success. Examples of key services provided include 1) prepare course schedules for new, incoming students and enroll them in classes, 2) help students prepare four-year degree plans during their first semester on campus, 3) organize and implement fall and spring group advising sessions led by the advisor and faculty, 4) implement UM advising policies and procedures in an effective manner for WBIO students, and 5) assist students with their applications for graduation.

Faculty mentors ensure that students experience one-on-one interactions with faculty during their undergraduate experience, most commonly in relation to experiential learning. WBIO places a high priority on providing quality experiential learning experiences to students. Some faculty also mentor student organizations that provide extremely valuable extracurricular opportunities for students to learn about and experience wildlife. Student organizations most popular among wildlife students and mentored by WBIO faculty include the American Fisheries Society, The Wildlife Society, and Backcountry Hunters and Anglers.

Undergraduate advising and mentoring is evaluated most commonly via a survey distributed to students toward the end of each academic year. Less structured feedback is also obtained continuously through one-on-one conversations between students and the program director, advisor and faculty members. Most students speak very favorably of the academic advisor. Reviews of faculty mentors are generally positive but more variable. Students who have worked closely with faculty are very favorable toward them and frequently describe their experiential learning experiences as the best part of their undergraduate experience. In contrast, students with minimal interaction with their faculty mentors are less favorable. Among the latter group, some students express concerns over the limited availability of their faculty mentors while others fail to see the value in meeting with their faculty mentors and only do so when required (e.g., to meet an experiential learning requirement).

Overall, faculty and students are pleased with the advising and mentoring process. The academic advisor position is key to this satisfaction. The position provides students a reliable, knowledgeable contact point and frees up faculty to spend more time serving students through experiential learning.
Graduate Student Advising and Mentoring: Graduate students typically receive extensive advising and mentoring from their graduate advisors. It is common for students to meet individually with their advisors on a weekly basis when on campus and additionally attend weekly graduate laboratory meetings led by their faculty advisor. Each graduate student also has a graduate committee comprised of faculty members who provide additional mentoring and support.

Staff advising and administrative support of graduate students is presently lacking in WBIO. As noted elsewhere, the WBIO administrative associate position was eliminated as part of staffing reductions implemented by UM in response to budget shortfalls. A large portion of this staff member’s job was to provide administrative support for the WBIO graduate program. Graduate students presently receive support from the WBIO undergraduate academic advisor and a graduate student admissions coordinator within the Franke College of Forestry and Conservation. There is a need for dedicated administrative support for the WBIO graduate program.

Graduate student feedback on advising and mentoring is provided most commonly through frequent one-on-one conversations with graduate advisors. The WBIO Graduate Student Association (WBGSA) also serves as a common voice for graduate students to express collective feedback to the program director and faculty on advising/mentoring and related issues. Additionally, one of the WBGSA officer positions serves as a liaison to faculty, who attends and represents graduate students at all faculty meetings. Students who experience challenges or conflict with their advisors and/or committee members are able to reach out to the WBIO Program Director for assistance in navigating the challenge or conflict. However, such conflict situations have been rare and have not required higher level intervention to achieve resolution. Most often, graduate advisors serve as advisor, mentor and advocate for their students, and in turn, graduate students are satisfied with the faculty support they receive.

Junior Faculty Mentoring: Mentoring also extends to faculty. All new, junior faculty members are assigned a more senior faculty member as a mentor. While there is no formal review of the process, the approach seemingly works well. Faculty mentors are especially valuable in helping junior faculty achieve milestones and navigate tenure and promotion processes.

Faculty: Research, Service, and Additional Creative and Scholarly Activity

Outstanding Achievements in Research and Scholarship: The WBIO Faculty were collectively ranked as the top group of wildlife faculty in North America by Academic Analytics in 2016 (the most recent ranking available to UM). This ranking was based on research productivity and scholarly performance as evidenced by publications, citations, grant activity, and notable awards. WBIO faculty published ~450 peer-reviewed journal publications during the past 3 years, which equates to an average of 6.3 publications/faculty member/year. Average Web of Science h-index for faculty is 26. Faculty generated $66 M in grants during the past three years. This includes a $20 M NSF EPSCoR RII Track-1 project managed by Dr. Ray Callaway. That grant aside, faculty generated $46 M in research grant funding over the past 3 years. Faculty have received 115 awards/honors (60 during the past 7 years), 40 of which have regional, national, or international scope/significance. A near-term concern for WBIO is that UM is no longer affiliated with Academic Analytics, and therefore, the program will not be able to report how it ranks against peer institutions moving forward.

During the past 3 years, our Program has had 2 active faculty and 1 emeritus faculty acknowledged as “Highly Cited Researchers”: Dr. Gordon Luikart (2018), Dr. Michael Schwartz (2016, 2017), and Dr. Fred Allendorf (2018, Emeritus). The designation “recognizes world-class researchers for their exceptional research performance, demonstrated by production of multiple highly cited papers that rank in the top 1% by citations for field and year in Web of Science.” Drs. Ray Callaway and Tom Martin are AAAS Fellows and Callaway is additionally a Regent Professor at UM.

UM WBIO is widely recognized for its pioneering work to advance wildlife conservation genetics. Most recently, Drs. Winsor Lowe and Michael Schwartz and former graduate students Drs. Kellie Carim and Taylor Wilcox advanced environmental DNA (i.e., eDNA) from a concept to an applied technique with globally significant implications for species conservation. Their work is making it possible to cost-effectively and non-invasively monitor fish, wildlife, and invasive species from samples of water,
snow, soil, and air containing shed animal DNA. They have also made it realistic for ecologists to more readily detect aquatic invasive species in a system before they become established.

Dr. David Naugle helped conceive the USDA’s Sage Grouse Initiative (SGI) and has served as their national science advisor for the past decade. SGI has directed more than $1 billion toward sage-grouse conservation on private lands through the Farm Bill. Dave has informed how and where those dollars are spent and has evaluated effectiveness of the conservation actions. His work was instrumental in the U.S. Fish and Wildlife Service’s decision to not list the greater sage-grouse as a threatened species under the Endangered Species Act. Dave received the Abraham Lincoln Honor Award from the USDA Secretary of Agriculture in 2016.

Dr. Scott Mills is conducting pioneering research on the scope for adaptation by animals to global climate change. He is well known for his research on species that change coat colors seasonally as a strategy to camouflage themselves against dark (summer) and white (winter) backgrounds. Scott has evaluated the capacity for these species to adapt as climate change reduces snow quantity and duration. He was an invited contributing author to the Intergovernmental Panel on Climate Change (IPCC) Special Report on Climate Change and Oceans and the Cryosphere in 2018-19.

Research conducted by Drs. Lisa Eby and Andrew Whiteley has been critically important for the conservation of native fish species threatened by introgression, habitat fragmentation, and climate change. Their work helps resolve conflicting management strategies, where an action to improve stream connectivity may simultaneously increase the potential for native fish to interbreed with non-native species. The results of their research are being used by Montana Fish, Wildlife and Parks and U.S. Fish and Wildlife Service to inform integrated conservation strategies for native fishes. In 2017, Dr. Whiteley received a NSF CAREER Award while Dr. Eby received the American Fisheries Society Excellence in Fisheries Education Award.

Drs. Libby Metcalf and Alex Metcalf are effectively integrating social science into wildlife biology, contributing to a transformation in how sociopolitical and economic data is incorporated into natural resource decision making. They were recently presented the Rabel J. Burdge & Donald R. Field Outstanding Article Award for their publication titled “Public Engagement in Social-Ecological Systems Management: An Application of Social Justice Theory” in Society and Natural Resources.

Drs. Paul Lukacs, Josh Millspaugh and Josh Nowak are working with more than half of the state fish and wildlife agencies in the United States to help them develop defensible wildlife monitoring strategies. They developed user-friendly software interfaces that enable biologists to analyze their wildlife data using the most sophisticated mathematical-statistical models in existence. This work is key to informing management decisions in the respective states, including harvest of game species and conservation of declining or imperiled species. In honor of their work, Dr. Lukacs received a Special Recognition Award from the Western Association of Fish and Wildlife Agencies in 2017 and Dr. Millspaugh received the Excellence in Elk Country Award from the Rocky Mountain Elk Foundation in 2019.

**Outstanding Examples of Service:** WBIO faculty are accustomed to heavy service contributions on top of teaching and research. At present, faculty members are performing the following roles at UM in addition to their faculty positions: Associate Vice President of Research for Global Change and Sustainability (Mills); Associate Dean, Division of Biological Sciences (Breuner); State Director, NSF Montana EPSCoR (Callaway); Director, Center for Integrated Research on the Environment (Callaway); Director, Avian Science Center (Dreitz); Director of Ecosystem Science and Restoration Program (Eby); Director of Parks, Tourism and Recreation Management Program (L. Metcalf); Faculty Senate (Hebblewhite, Millspaugh); and data analyst for university-wide student recruitment and retention efforts (Lukacs). Faculty additionally serve on numerous university, college, and program committees.

WBIO faculty additionally contribute substantive service to the profession. Notable examples within the last 3 years include: President, National Association of University Fisheries and Wildlife Programs (Bishop); President, American Fisheries Society Genetics Section (Whiteley); Past-President, Cooper Ornithological Society transferred to American Ornithological Society
(Martin); Scientific Program Committee, American Ornithological Society (Dreitz); Ad Hoc Executive Committee Member, Society for Integrative and Comparative Biology (Breuner); National Science Foundation Grant Review Panel Member (Breuner, Cheviron, Hebblewhite, Lowe, Martin, Mills); National Institutes of Health Panel Member (Good); Contributing lead author, Asia-Pacific assessment by the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES, Brodie); External Evaluator, German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig (Callaway); Advisory Board, Bhutan Foundation, Washington, D.C. (Mills); Scientific Commission of the Fund for Scientific Research (FNRS) of Belgium (Lowe); International Union for the Conservation of Nature (IUCN) Committee Service (Brodie, Mills); Scientific Advisor for the Boreal Caribou Recovery Planning, Environment and Climate Change Canada (Hebblewhite); National Review Board for the Canada Research Chairs Program (Martin); Facilitation of Structured Decision Making Workshops for State and Federal Agencies on controversial wildlife issues (Mitchell); Associate Editors: Trends in Ecology and Evolution (Callaway), Ecology (Hebblewhite), Ecological Monographs (Hebblewhite), Conservation Genetics (Schwartz), Human Dimensions of Wildlife (L. Metcalf), Rangeland Ecology and Management (Dreitz), and Journal of Wildlife Management (Hebblewhite and L. Metcalf); Guest Editor for a Special Issue, Genes (Cheviron) and Molecular Ecology (Good); and Handling Editor, Conservation Biology (Schwartz).

Each faculty member also serves as an ad hoc reviewer for a host of scientific journals, and a number of faculty teach courses and workshops to professionals in the field.

Faculty members also serve the community in various capacities. Examples of community service include: Board of Directors, Swan Valley Connections (A. Metcalf); Board Member, Wild Rockies Field Institute (L. Metcalf); Board Member, Roxy Theatre (Missoula) and International Wildlife Film Festival (Bishop); Osprey nest camera, citizen science and community engagement program (Greene); Clark Fork Coalition Technical Advisory Team (Eby); The Nature Conservancy Science Advisory Council (Eby); Board of Directors, Yellowstone to Yukon Conservation Initiative (Hebblewhite); Rocky Mountain Elk Foundation Project Advisory Committee (Millspaugh, Hebblewhite); and Wildlife corridor planning and protected area management in Malaysia (Brodie). Our faculty also do significant science communication and outreach. Three different faculty have recently been on the SciShow with Hank Green (Hebblewhite, Luis, Mills), and one of UM’s WBOI doctoral students is a co-host of SciShow Psyche (Brit Garner). Other examples include working closely with the School of Journalism, supporting and assisting the International Wildlife Film Festival and IWFF LABS, and producing children’s books.

**Recognizing and Rewarding Research and Service:** Faculty are recognized and rewarded for research and service through the faculty evaluation process. Research and service are explicitly evaluated in the unit standards for each academic department represented within the Wildlife Biology Program. Faculty who exceed standards are recommended for merits and promotions. WBOI faculty routinely exceed expectations and have a strong track record of receiving timely merits and promotions. Less formally, faculty are acknowledged for their research and service contributions through various awards and honors, as mentioned earlier.

**Collaboration with Centers and Institutes:** WBOI faculty members direct or lead the following UM centers: USGS Montana Cooperative Wildlife Research Unit (Mitchell), Montana Avian Science Center (Dreitz), and Center for Integrated Research on the Environment (Callaway). These centers are integral to WBOI’s success in research. WBOI faculty member, Gordon Luikart, is a professor and scientist at Flathead Lake Biological Station (FLBS). WBOI collaborates closely with FLBS to advance research and to support field-based experiential learning. WBOI faculty member, Erick Greene, leads the UM Bird Ecology Lab, which advances avian science while actively engaging the community. Additionally, WBOI faculty member, Mike Schwartz, leads the US Forest Service’s National Genomics Center for Fish and Wildlife Conservation, which is located on UM’s campus. The partnership between this center and UM has enabled dozens of faculty and students to advance the field of fish and wildlife conservation genetics. Several WBOI faculty also work closely with UM’s Numerical Terradynamic Simulation Group (NTSG), which has led to advances in landscape-level conservation from regional to global scales. Finally, WBOI also maintains close associations with the Montana Forest and Conservation Experiment Station, Montana Climate Office, Montana Institute on Ecosystems, Wilderness Institute, and the Institute for Tourism and Recreational Research.

**Staffing, Facilities, and Other Resources**
Adequacy of Current Facilities, Equipment, Support Staff: Inadequacy of facilities and support staff is a significant challenge facing WBIO. Insufficient office and graduate lab space is a severe problem for the Program overall. Some WBIO faculty and graduate students work in crowded, suboptimal conditions because there are no options to secure additional space. WBIO faculty and students are presently distributed across 8 buildings on campus. Lack of space directly limits program growth. Insufficient office space also severely limits opportunities to bring visiting scholars and post-doctoral fellows to campus. On occasion during the past four years, faculty have routed funding to collaborators at other universities given insufficient space at UM to support projects. Further, the Program no longer has storage space on campus for classroom materials and equipment and presently rents storage south of Missoula, which leads to inefficiency and added program costs to pay for storage. WBIO faculty and students are also negatively impacted by insufficient computer labs and computing resources, which has become an acute problem in recent years as WBIO has grown. Student numbers often exceed the number of available computers in labs tied to key upper division curriculum classes that all WBIO students are required to take (e.g., WILD 470 – Conservation of Wildlife Populations). Biological laboratories for teaching undergraduate students have not been upgraded in decades and are also in need of renovation. The lack of quality teaching space and laboratories pose continual challenges for both instructors and students. The FCFC has developed a formal proposal and fund-raising strategy for a new building to address space deficiencies in WBIO and other programs within FCFC; however, given funding shortfalls at UM, all money for the building will need to be raised privately. A new building likely won’t be constructed for a number of years, unless the Montana University System (MUS) were to identify the FCFC building as a priority and work to secure public funding.

As noted earlier, support staff is also a significant problem for WBIO. In December 2017, WBIO lost its administrative staff support position due to a voluntary severance offer made by the UM administration to staff. In response, the Dean of FCFC, Tom DeLuca, has shared his administrative staff support position with WBIO. The current situation places an unreasonable workload on the present administrative staff position and has led to a situation where important tasks are not being accomplished. WBIO presently views this as an untenable situation that is compromising its ability to be effective in student recruitment and support while requiring overextended faculty to perform increasingly more administrative responsibilities.

WBIO’s undergraduate academic advisor also carries a heavy workload, serving 325-350 students. WBIO has been challenged by UM President Bodnar to grow by an additional 100 undergraduate students. If this growth is realized, WBIO will require another academic advisor position.

Library Holdings and Adequacy of IT: Library holdings remain relatively strong and are adequate to meet WBIO research and education needs, although there have been multiple proposals in recent years to reduce library holdings as part of achieving budget savings. Each time, faculty across campus have clearly expressed that such reductions in holdings would be problematic, and in response, UM has found ways to maintain holdings.

IT support at the College level has been very strong and continues to be exceptional in FCFC. However, reductions in central IT staffing have reduced support relative to technology in classrooms, computing labs, and other technology resources. UM’s Cyberbear, Degree Works, and related software that support undergraduate education are exceptional and have come a long ways over the past few years. UM’s efforts on this front have led to considerable efficiencies and have greatly improved the educational process for students. However, a comparable degree-tracking and record system is needed at the graduate student level.

Part C. Educational Outcomes

Refer to Appendix 2, WBIO’s most recent Program Assessment Report, which focuses exclusively on educational outcomes of our undergraduate and graduate programs.

Part D. Future Goals and Priorities
1. **Maintain status as a top-ranked wildlife biology program in North America**  
   **Plan:** Continue to prioritize research, graduate student education, and experiential learning for undergraduates, which is the basis of our Program’s top ranking by Academic Analytics.  
   **Timeline:** Ongoing/continuous.  
   **Status:** During the past academic year, we have emphasized the importance of research to the UM Administration at every opportunity and explained how research directly supports both graduate and undergraduate education at UM. We will continue to work with the UM administration using every possible avenue to preserve research as a priority for WBIO and UM overall.

2. **Strengthen our core: Increase capacity in key subject areas to strengthen the core undergraduate and graduate curricula**  
   **Plan:** Strengthen our existing program by adding faculty and expertise in ecology, fisheries, human dimensions, policy, and quantitative ecology.  
   **Timeline:** Ongoing/continuous.  
   **Status:** We added a fisheries line in 2015-16 in response to our last Program Review where fisheries was identified as an area requiring greater emphasis. Fisheries remains an area where we would like to strengthen our program to be more competitive with regional peer institutions who have larger fisheries faculties. Ecology is foundational to our program, yet two of UM’s ecology faculty have transitioned to part-time and will be retiring in the near future. It is critical that we replace these faculty lines with another ecologist(s) to preserve this critical emphasis and provide instructional support for General Ecology courses (i.e., BIOE 370 and 371). Human dimensions (HD), policy, and quantitative ecology are increasingly important in the wildlife biology field. Employers frequently emphasize the growing importance of wildlife HD and policy, while quantitative ecology is essential for faculty and students to remain current and relevant as scientists. Our faculty serving these various roles are overextended and unable to keep up with student demand. Faculty with expertise in HD and policy at UM primarily serve other academic programs, further emphasizing the need for enhanced capacity within WBIO. This goal is directly linked to accomplishing goal three below.

3. **Grow WBIO by 100 undergraduate students (charge from UM President Seth Bodnar)**  
   **Plan:** Develop and execute a multi-faceted strategy to grow WBIO by 100 students.  
   **Timeline:** WBIO developed a growth plan in 2018 and began executing the plan in 2019. Presently, the goal is to grow by 100 additional students within 3-5 years.  
   **Status:** WBIO Faculty underwent a Structured Decision Making (SDM) process during the Autumn 2018 semester to produce a comprehensive growth plan that identifies several alternatives and growth/investment strategies. The SDM process was led by WBIO faculty member and Cooperative Wildlife Research Unit Leader, Mike Mitchell. The plan is included as Appendix 8. During Spring 2019 semester, WBIO intensified its student recruitment and retention efforts. As examples, WBIO implemented and self-funded two digital marketing campaigns targeting students in regions of the U.S. where the Program presently has a strong representation of students (and thus some brand recognition). We partnered with UM’s Vice President of Student Enrollment, Cathy Cole, to obtain data on student inquiries, admissions, and enrollment. Faculty member, Paul Lukacs, conducted an analysis of these data using “mark recapture” methods commonly employed in wildlife demographic analyses to better understand our current situation and to inform strategic, future investments in recruitment. Paul’s work was so well received by the UM Administration that UM President Bodnar requested Paul to work on behalf of UM during the 2019-20 academic year on student recruitment and retention. We also modified our introductory wildlife biology course (WILD 180) to expand access to students off campus. Beginning in Autumn 2019, the course will be offered to students off campus as a remote, synchronous offering. UM Online and UM Marketing partnered with the program to market the course as a dual enrollment offering to high school students across Montana.
4. Enhance diversity and inclusion with an emphasis on expanding educational opportunities for Native American students and modifying pedagogy through incorporation of traditional ecological knowledge (TEK).

**Plan:** Intentionally pursue actions to promote diversity, equity, and inclusion in WBIO. Examples of these actions include: 1) evaluate equity of graduate admissions process and modify as warranted, 2) capitalize on new and existing resources to financially support students from underrepresented groups (e.g., Sloan Indigenous Graduate Partnership), 3) partner with UM in creating a more inclusive environment for Native students and other students from underrepresented groups, 4) enhance our partnership with Salish Kootenai College (SKC), 5) incorporate indigenous knowledge into our undergraduate curriculum, 6) foster opportunities to blend TEK and western science research methodologies in WBIO graduate degree programs, and 7) promote increased awareness among faculty and students by capitalizing on existing UM resources (e.g., implicit bias training, “Tunnel of Oppression”, UM Allies training).

**Timeline:** We initiated efforts on this goal during the 2018-19 academic year and otherwise consider them to be ongoing and continuous for the foreseeable future.

**Status:** To begin accomplishing this plan, during 2018-19, we evaluated our graduate admissions procedures and are now in the process of transitioning to a holistic review process that places less emphasis on GRE scores. We invited and hosted Dr. Patrick Zollner from Purdue University, who delivered seminars and shared experiences on his efforts to meaningfully connect with Tribal communities and support Native graduate students. We admitted three Native American students into our WBIO graduate program who graduated with their Bachelor’s degrees from SKC in spring 2019. Multiple WBIO faculty attended implicit bias trainings as encouraged by the UM Provost. We initiated efforts to incorporate TEK into our curriculum by incorporating guest lectures into existing classes, which we will expand going forward.

5. Innovate new paths forward: Expand curricular, and possibly degree, offerings in areas where the profession has demonstrated need.

**Plan:** Explore opportunities to expand and/or modify degree offerings in WBIO to meet employer needs and increase suitability of graduates for jobs. This goal ties to goal three as it could facilitate additional program growth and new faculty hires. If warranted, pursue necessary curricular changes to modify or expand degree program offerings.

**Timeline:** There is no specific timeline, although WBIO will begin analyzing options during the next couple of years in conjunction with the goal of growing the Program.

**Status:** We have had only preliminary conversations as a faculty. We recognize a need to respond to input from key UM employers and partners and to continuously look for opportunities to innovate and meet future demands. For instance, employers have expressed needs for job applicants with knowledge and skills that are not sufficiently covered within our current undergraduate or graduate curriculum. We could meet these needs by having students take additional courses in some combination of communication, policy, law, public administration, strategic conservation planning, private lands conservation, conflict resolution, and leadership. However, we cannot add additional required coursework to our undergraduate curriculum without removing other courses that are essential to a wildlife biology degree. Graduate students have more flexibility in their course selections, but most students necessarily take advanced courses in wildlife biology, biology, ecology, math, statistics, social science, and closely related fields to be successful in completing their graduate research and theses/dissertations. They, too, have limited capacity to take additional courses. In light of this inherent challenge, we will evaluate opportunities to incorporate certificates, minors, or possibly an alternate graduate degree that could meet these demands. Most recently, we collaborated with the UM Law School to create a “4+1” program where students could earn a B.S. in Wildlife Biology and M.S. in Public Administration in five years (instead of six). We will also explore opportunities for partnering more closely with employers and research sponsors in the educational process so that students graduating from our programs will be better prepared and more qualified for available jobs in the wildlife field.

**Major Obstacles:** The primary obstacle to accomplishing these goals is capacity. WBIO faculty and staff are spread thin, and at least based on a self-assessment, overworked. A majority of WBIO faculty serve more than the WBIO Program. Specifically, they additionally support degree programs in Biology; Organismal Biology and Ecology; Ecosystem Science and Restoration;
Parks, Tourism, and Recreation Management; and Resource Conservation. Faculty who solely or primarily support WBIO necessarily have a disproportionately higher workload tied to the WBIO Program. Some faculty are employed by other entities and are therefore accountable to those employers as well. As noted above, the lack of dedicated administrative staff and diminished grant/accounting support has had a significant, negative impact on WBIO capacity. Finally, lack of an operating budget inhibits the Program’s ability to effectively meet needs of existing students or to implement strategies to achieve the stated goals above. For these reasons, WBIO requested an up-front investment to support additional program growth (Appendix 8).

**Interactions with Other Units at UM:** WBIO is an interdisciplinary program comprised of faculty from FCFC, DBS within CHS, and the MCWRU. Thus, the primary interactions exist within and among these 3 units.

WBIO also has close working relationships with the DHC. There are more DHC students majoring in Wildlife Biology than in any other degree program (currently 68 students). WBIO students have received 12% of all Presidential Leadership Scholarships (PLS) awarded by UM, with an especially high representation among out-of-state students (7 out of 11 in 2018, 5 out of 14 in 2019). PLS is the premier freshman scholarship offered by UM to incoming students. As another indicator of partnership, WBIO faculty have served on the PLS selection committee and on DHC’s Teaching, Research, and Mentoring (TRM) Post-doctoral Fellowship selection committee. WBIO teaches one honors course each semester, WILD 240 (Honors Biostatistics), which has been an effective class for optimally preparing WBIO undergrads for key upper division classes. Previously, WBIO employed an adjunct instructor who taught WRIT 325 (Honors Science Writing). Unfortunately, that adjunct position was eliminated in 2016 due to budget reductions. We hope to permanently restore WRIT 325 because WBIO undergraduate students who took the course commonly referred to it as one of the most impactful classes they experienced at UM. Most recently, WRIT 325 was offered by one of DHC’s TRM Fellows, but that does not provide a long-term solution.

WBIO works closely with the Office of Research and Creative Scholarship because research is of central importance to the Program. This office includes the Office of Research and Sponsored Programs (ORSP), Graduate School, Research Compliance, Federal Relations, and Broader Impacts Group, among others. WBIO’s success at UM is directly connected to each of these units in one manner or another. Additionally, the MCWRU is administratively tied to the Office of Research and Creative Scholarship. Ultimately, WBIO depends on a strong research administration and infrastructure at UM to be effective.

WBIO also collaborates with Journalism, Law, and Business in addressing educational outcomes and societal issues that span the various disciplines. Looking forward, there may be opportunities to more formally expand collaborations with the College of Visual and Performing Arts as we are seeing increasingly more students pursue dual interests in WBIO and the Arts.

**Part E. Other**

**Development:** WBIO has a strong track record of successfully securing private financial support to strengthen the Program. WBIO has two endowed chairs: the Boone and Crockett Professor of Wildlife Conservation and the John J. Craighead Professor of Wildlife Conservation. The Boone and Crockett Professorship has an accompanying research endowment that supports research and graduate education. WBIO has a host of scholarships and graduate fellowships, some of which are endowed and some that are not. WBIO awards roughly $125,000 in scholarships and fellowships to its students annually. Significant, additional scholarships are awarded to WBIO students at the College and University level. Private support is also instrumental to supporting student travel, research, and professional development. WBIO also relies heavily on unrestricted gifts to support alumni receptions, host events on campus (e.g., International Wildlife Film Festival), and presently, for general operation of the Program.

WBIO has a Wildlife Leadership Council (WLC) comprised of 15 individuals who help the program by directly or indirectly securing financial contributions to support faculty and students as described above. WLC members also provide guidance in helping the Program stay relevant and current to society. The WLC meets 1-2 times per year and members are additionally
available for periodic email or phone communication as needs arise. With help of the WLC, WBIO recently secured funding to
hire a full time (1.0 FTE) Director of Development through the UM Foundation. Alina McCue was hired into the position July
1st, 2019, replacing Dan Pletscher. Dan was employed by the UM Foundation at 0.25 FTE; thus, the addition of a full time
Development Director should enhance WBIO’s development capacity. Current Program priorities include funding for
undergraduate scholarships; graduate fellowships; post-doctoral fellowships; summer salary for faculty; travel support for
students and faculty; new and upgraded lab and office space; a John J. Craighead research endowment; an endowed chair in
waterfowl and wetlands ecology; and a wildlife biology opportunity fund to support programmatic needs as they arise.
I. OVERVIEW

The University of Montana-Missoula’s (UM) Wildlife Biology Program (WBIO) has the following Mission Statement

“The Wildlife Biology Program has a focus on the ecology and conservation of freeliving organisms and their habitats. We seek to provide the highest quality program contributing to the knowledge and conservation of wildlife in Montana, the region, and the world. To accomplish this, we (1) teach and administer B.S., M.S., and Ph.D. programs concerned with the biological, ecological, and social/political issues underlying the conservation of wildlife and the habitats in which they live; (2) advise and prepare undergraduate and graduate students for their careers and future education; (3) link basic and applied wildlife research contributing to the information needs of resource management agencies, science-based government and non-government agencies and organizations, and the general public for research-based information; and (4) serve the university, profession, and public.”

This meshes well with the university’s Mission Statement

“The University of Montana transforms lives by providing a high-quality and accessible education and by generating world-class research and creative scholarship in an exceptional place. We integrate the liberal arts and sciences into undergraduate, graduate, and professional studies to shape global citizens who are creative and agile learners committed to expanding the boundaries of knowledge and to building and sustaining diverse communities.”

As a joint program drawing from faculty and resources from the W. A. Franke College of Forestry and Conservation (FCFC), Division of Biological Science (DBS) within the College of Humanities and Sciences (CHS), and the Montana
Cooperative Wildlife Research Unit (MCWRU), WBIO is an outstanding example of a highly successful and truly interdisciplinary program with exceptional faculty that have a strong commitment to teaching, research, and outreach. The program is one of the top programs in the U.S., garnering a #1 ranking for North America by Academic Analytics in 2016. It is thus not surprising that WBIO attracts excellent undergraduate and graduate students and has been named within UM as a Program of National Distinction.

The WBIO faculty are recognized for their research and scholarship in helping to solve important wildlife conservation issues. The faculty are also serious about excellence in mentoring and teaching, incorporating research knowledge into the classroom and the many experiential learning opportunities afforded WBIO students. The program also attracts state (e.g., Montana Department of Fish, Wildlife and Parks), federal (e.g., U.S. Forest Service, U.S. National Park Service, U.S. Fish and Wildlife Service, National Science Foundation), and NGOs (e.g., The Nature Conservancy, Trout Unlimited, National Geographic Society, Safari Club International) partners who collaborate on projects, sponsor research, and hire graduating students. Increasing diversity, equity, and inclusion (DEI) of its faculty, students, and staff is a challenge, as it is with many Rocky Mountain Region universities, but WBIO recognizes the need, and is emphasizing graduate education opportunities for Native Americans, e.g., with nearby Salish-Kootenai College.

High enrollments over the last decade, including a large proportion of nonresident students that helps increase UM revenue has been a bright spot for the program, but the enrollment has created or exasperated some challenges. Major challenges for WBIO in the last several years have included: funding and permission to replace a vacant administrative staff support position, lack of a base operating budget, increased faculty workload, need for additional faculty/instructors, and outdated and/or undersized facilities. To help with UM’s low enrollment WBIO has been challenged to further increase student numbers by 100 in the coming years. Without additional resources, this increased enrollment will exacerbate the current strain on the program. The program’s past success in increasing enrollment suggests that it is in a good position to help. WBIO is up to the challenge and has outlined a recruitment plan that will depend on added investment from the university. Overall, additional support for WBIO has great potential to produce a positive impact for UM in the areas of enrollment, research expenditures, the overall university budget, and UM’s standing.

In the following paragraphs, we review the program’s structure, the faculty, undergraduate and graduate students, and current facilities. In each section, we address strengths and challenges and make recommendations for improvement. Finally, we conclude with an overall summary.

II. THE WILDLIFE BIOLOGY PROGRAM STRUCTURE

A) Leadership
Dr. Chad Bishop is the program director and has been in that position since 2015. He also holds a faculty position as an associate professor in the Department of Ecosystem & Conservation Sciences within the FCFC. In his faculty role, he teaches courses and conducts research that supports his graduate students. Administration of WBIO primarily focuses on the WBIO degree programs (BS and MS in Wildlife Biology and PhD in Fish and Wildlife Biology). Decision making appears to be very collaborative with the Director guiding day-to-day operations and faculty involvement in decisions through weekly faculty meetings and various faculty committees (Undergraduate, Graduate Admissions, and Graduate Evaluations). Higher-level decisions are made by the Wildlife Advisory Group (WAG), comprised of the Dean of FCFC, Associate Dean of DBS, Leader of MCWRU, and the Director of WBIO. FCFC, DBS, and MCWRU make their own administrative decisions with respect to their degree programs, and the faculty and students that reside within
them; this includes their overall budgets and day-to-day operations. When decisions of the three advisory groups affects WBIO programs, then input from the WBIO Director is welcomed. Overall, there was strong support for the leadership of Dr. Bishop as Director of WBIO.

Some of the day-to-day responsibilities of the Director include overseeing the undergraduate and graduate programs, arranging teaching assignments for WBIO courses, and, as necessary, facilitating research and outreach by WBIO faculty and students. Coordinating these responsibilities with FCFC, DBS, and MCWRU is thus important. The Director also manages a very successful development program of private giving to WBIO.

B) WBIO Staff

In addition to the Director, WBIO has an administrative associate who provides broad administrative support for the director, faculty, and students. This individual is also key in coordinating the WBIO graduate program. Unfortunately, due to the voluntary severance offer (VSO) policy, instituted during the university downturn, this position has been vacant since December 2017. The fact that the VSO policy did not allow backfilling of positions, resulted in the administrative associate’s duties having to be assumed by the WBIO Director and faculty, adding to workload issues in WBIO. We applaud the Dean of FCFC for eventually providing support by allowing four FCFC staff to help administer theWBIO graduate program. Recently, the Provost approved funding to fill the administrative associate position and, once hired, this will be welcome help for WBIO and staff. Two concerns, at least among FCFC staff, are low salaries, below a living wage for Missoula, and the lack of opportunities for advancement. In particular, the cost of housing was mentioned as a serious impediment. These concerns are leading to lower staff morale, potential burn out, and should be considered when the WBIO administrative associate position is filled.

Another WBIO staff position is the Assistant Director for Development and Alumni Relations, currently filled by Alina McCue. This position is equally funded by UM Foundation and development funds generated by the WBIO program. The position is rooted in the successful development efforts of the past WBIO Director, Dan Pletcher, who was instrumental in developing support for the two endowed professorship linked to WBIO: the Boone and Crockett Professor of Wildlife Conservation associated with FCFC and the John J. Craighead Professor of Wildlife Conservation associated with DBS/CHS. The Asst. Director of Development works with the WBIO Director and Advisory Council, which includes well-placed Montanans who have been very helpful with fundraising. Another responsibility of the Asst. Director is meeting with WBIO alums and others to foster support for program priorities such as undergraduate scholarships, undergraduate and graduate student recruitment resources, graduate student financial support, and unrestricted operating funds. Currently, unrestricted funds are critical in providing the only base funds for WBIO operations. Alums and friends of WBIO are much more interested in supporting direct education and research priorities of WBIO, making the promotion of “the need for operating funds” difficult.

C) Program Support

The Wildlife Biology Program receives no annual operating expenses from the partnering units or UM administration. To operate, WBIO has relied on private gifts to the UM Foundation allocated for unrestricted use by WBIO. The colleges supporting WBIO recognize the benefits to their respective units in terms of faculty productivity and student quality and numbers, yet direct program support from block budgets is limited. As mentioned in the previous section, there has been some staff support from FCFC that has been very helpful in the last few years.

Unfortunately, there appears to be no direct support for operations or staffing from DBS, despite making up about 1/3 of the faculty.
Both WBIO faculty and FCFC staff mentioned a lack of adequate space to meet the need for classes; this is hindering scheduling and affecting the ability of undergraduate students to graduate on time. In particular, there is great need for additional sections of mathematics and chemistry, and key upper division courses.

Staff mentioned that advising is integrated within FCFC, which is very beneficial to WBIO undergraduate students. The need for additional administrative staff to support the university’s interest in managing a database to track retention, graduation rates, etc. was also identified. In the past, the person tracking this information was ¾-time and would have to take work home in order to keep up with the tasks.

D) Identified Directions

1. Diversity, Equity, and Inclusion (DEI) is recognized by WBIO as being important in attracting and educating the next generation of wildlife professionals. As such, WBIO is placing an increased emphasis on recruiting a more diverse student body, focusing on Native Americans.
2. Research on climate change and sustainability has been and will continue to be a priority for WBIO faculty. This emphasis links well with the Environment and Sustainability Community within UM’s Communities of Excellence.
3. Recognizing the importance of private lands in wildlife conservation, WBIO is placing a higher priority on collaboration with landowners on education and research in this area. WBIO faculty have historically worked closely with landowners and looks to increase these activities through more direct infusion of partner-based conservation into its curriculum, and better preparing students for future opportunities that will involve developing partnerships between wildlife agencies and landowners.
4. Interdisciplinary work is a hallmark of faculty and students in WBIO. In addressing fish and wildlife conservation issues, WBIO has also developed collaborations with other programs at UM, e.g., Journalism, Business, Law, and Environmental Studies at UM, as well as UM Communities of Excellence initiatives within the Environment and Sustainability Community.

E) Program Strengths

1. Faculty and administration value the WBIO program for its interdisciplinary nature, the excellent students it attracts, and its reputation.
2. Attracts outstanding faculty due to the strength and reputation of WBIO.
3. Attracts quality students and enrollment has been high. A large proportion of the students are nonresident students with resulting added value through increased university revenue.
4. WBIO has continued to attract donors, which has been critical for as the program’s only operating funds. Approximately, half of the Foundation funds are endowed and support two endowed professorships with other funds directly supporting students as scholarships and fellowships.

F) Challenges & Recommendations

1. Staffing- WBIO is clearly a program of excellence for UM. The lack of an administrative support staff for the program for over 2 years was unquestionably a huge challenge for the program. From our interviews, we realize that the recent workforce reduction adversely affected numerous programs across UM, and we can only hope that the university upper administration will implement safeguards to ensure that programs, especially those that are excelling and helping to fuel the university’s success, do not suffer from such decisions in the future. Considering the number of students and faculty in WBIO, it is easy to argue that there should be at least two administrative support staff. In particular, a second support person could help with grants and accounting. From our understanding, lack of support from the Office of Research and Sponsored Programs (ORSP) due to understaffing, is negatively impacting faculty and graduate students who depend on that support to keep up with WBIOs high research grant activity; in addition, insufficient postaward grant support from ORSP has likewise frustrated grantors and compromised research funding.
2. Operating Budget: Limited operational support was identified as a major challenge for WBIO in the last Program Review in 2012. The fact that WBIO receives no base funding from the university for operations is thus discouraging. In our interviews, we thus asked each administrator how this situation could occur and how it can be rectified. All pointed to the downturn in the budget and numerous needs across the university. We recognize the challenge that comes during a budget downturn, but for such a respected and productive program within UM, correcting this situation should be a priority.

3. Indirect Cost Recovery: A relatively small percentage is returned to respective administrative units and individual faculty, but most IDC is retained centrally in the Office of the Vice President of Research and Scholarship (OVPRS). Since the respective units that link to WBIO, i.e., DBS, FCFC, and MCWRU, have not historically provided a portion of their IDC return, we mentioned to the Vice President of Research and Creative Scholarship that even a small percentage return of IDC directly to WBIO could address the annual operations budget challenge. A direct return from the OVPRS makes sense, in that it would directly recognize the contributions that WBIO makes to UM, reduce the “begging to the colleges” hurdles that WBIO must navigate with DBS and FCFC and MCFWRU, and such a model has been used at other universities where similar interdisciplinary programs exist.

4. Office of Research and Sponsored Programs (ORSP) Support: Less grant and accounting staff support is negatively affecting grant activity by faculty and graduate students. In particular post-award challenges are affecting research sponsors. Central admin reports aren’t accurate, and college is penalized due to inaccurate reports.

5. Faculty workload: Over the past five years, UM has been forced to reduce staffing and key positions were not backfilled in response to overall declines in student enrollment. Most faculty have been asked to take on additional administrative and teaching responsibilities while attempting to sustain large research programs that are critically important to the continued success of WBIO. This challenge is not unique within UM, but it is especially acute within WBIO because the program has maintained enrollment. Certainly, the new instructor position will greatly help to alleviate workload pressure on faculty and help to fulfill course needs, especially for the undergraduate major in WBIO. Finally, office and lab space are insufficient to support the current size of the Program.

III. FACULTY

A) Strengths

1. Undergraduate and graduate students highly regard faculty and many students stated that faculty were the reason for choosing WBIO at UM. Through their research and reputation, WBIO faculty are attracting excellent graduate students, often outcompeting peers at other institutions, who are important in the national recognition of the program.

2. Research
   • Nationally and internationally recognized for their research, e.g., 2016 ranking by Academic Analytics including significant scholarship, grantsmanship, and awards/honors. Several faculty have reached the highest levels of recognition, e.g., UM Regent Professor, AAAS Fellowships, “Highly Cited Researchers”.
   • Strong interdisciplinary research that is recognized for tackling challenging and relevant conservation topics, such as global climate change; wildlife conservation genetics (e.g., environmental DNA) that will impact global species conservation; sustainability (e.g., USDA’s Sage Grouse Initiative impacts public and private lands organizations and people, conservation of native fish in Montana); integration of social science into wildlife conservation decision making; leadership/director roles for numerous collaborative research centers and institutes.
   • Direct support for state, federal, and NGO organizations as well as the private sector, e.g., direct partnerships leading to collaborative conservation efforts.

3. Teaching:
   • Undergraduate and graduate students highly regard faculty as educators.
   • All tenured and tenure-track faculty teach, except those with buyouts or serving in administrative roles, and faculty recognize the benefits of integrating their research into teaching.
• Modern pedagogy, e.g., active learning and flipped classrooms, and technology, e.g., iClickers and Top Hat, is being utilized by faculty in teaching.

• One-on-one, experiential learning opportunities, e.g., internships, independent studies, and senior theses, are a major component of the WBIO undergraduate program and are important in attracting and retaining undergraduate students. These experiences are also important in preparing students for professional careers and post-graduate education.
• Off-campus courses and workshops provide external learning opportunities for students and professionals and exposure for UM.

4. Outreach:
• Service includes leadership/administrative roles within UM ranging from college-level positions, e.g., associate deans, Assoc. VP of Research, Directorships.
• External Service includes leadership roles for several professional societies, committee responsibilities on national (e.g., NSF, NIH) and international panels, associate editorships of a number of leading scientific journals, and community involvement on boards and advisory teams.
• A number of faculty are serving on a Mental Health Working Group that is focused on improving the wellbeing of the WBIO community. With mental health becoming a greater concern for universities, this is a wonderful initiative and should complement other UM efforts such as those through the Curry Health Center.

B) Challenges
1. A need to increase the number of faculty to alleviate workload pressures due to increases in undergraduate enrollment, loss of staff, and faculty retirements.
2. To ensure adequate courses are taught for the WBIO major, some faculty, e.g., aquatic faculty, have a greater teaching load, which needs to be addressed to ensure equity across program in teaching, research, and service.
3. Maintaining high research productivity, which is a strength within WBIO, will be a challenge due to increasing demands on faculty time because of higher undergraduate enrollment, teaching loads, and lack of adequate staff support. There will be increased potential to lose some faculty to other universities that have a more attractive balance in teaching and research. Less research would result in less overall revenue for UM, and potentially fewer graduate students.

C) Recommendations
1. Increase the number of faculty in WBIO. This will be necessary to support and sustain the large undergraduate enrollment and to ensure that WBIO can meet the desired 100-student increase in coming years. The recent approval of an instructor position for WBIO is certainly a start, but there is a need for additional faculty. It will also be necessary to refill any vacant faculty positions and bolster priority research areas as faculty retire, e.g., ecology and human dimensions/policy of wildlife have been identified as areas of need. The addition of another fisheries faculty since the last External Review is noteworthy, but UM still has a very small fisheries program; additional fishery faculty are needed if WBIO is to be competitive with peer institutions.
2. All faculty that support WBIO also participate in other degree programs in their home departments of Biology; Organismal Biology and Ecology; Ecosystem Science and Restoration; Parks, Tourism, and Recreation Management; and Resource Conservation. As such, some have higher workloads when support of WBIO is included. Further, there appears to be a disproportionate burden on WBIO faculty from FCFC that have higher teaching loads compared to DBS. This inequality contributes to lower morale and may create an incentive for faculty to seek positions elsewhere. We recommend that faculty workloads are equalized to prevent potential losses.
IV. UNDERGRADUATE PROGRAM

A) Strengths

1. Between 2009 and 2011, the WBIO enrollment grew by about 100 undergraduate students (from 250 to 350). Despite a 40% decline in overall enrollment at UM, the WBIO had approximately 340 students in fall 2019, highlighting the strength of the program.

2. Based on WBIO’s success through the years, the administration is encouraging the program to grow by another 100 students. To help with recruitment, WBIO hopes to raise approximately $80,000 for student fellowships ($5,000 each) to help defer tuition costs.

3. The undergraduate program has over 50% out-of-state students, which generates additional tuition revenue for UM.

4. The majority of undergraduate students chose UM and WBIO because of faculty reputation and the relatively low tuition. The campus visit, and especially meeting with faculty, was mentioned by students as the main reason for the decision to join the program.

5. The WBIO curriculum is another strength in recruiting and retaining undergraduate students. Specifics include:
   a) the 1-credit freshman seminar course, “Wildlife Interest Groups”, with a small class size of 25 students;
   b) Incorporation of “flipped classrooms” pedagogy in large introductory courses with the help of undergraduate “Learning Assistants”; 
   c) the 2-credit “Experiential Learning” requirement, that allows flexibility of completing this requirement with coursework, internships, volunteering, and summer jobs; and 
   d) the senior research project in junior year for students with a ≥3.5 GPA (some students with GPA ≥3.0 are also allowed to participate).

6. The WBIO supports several student chapters: the American Fisheries Society, Backcountry Hunters and Anglers, and The Wildlife Society. This provides the students with opportunities to engage in professional activities, field trips and network with professionals through bi-monthly meetings, state and national conferences, and participation in research. The “Hunting for Sustainability” and “Hunt Mentorship” programs are especially influential and attractive to students.

7. The curriculum of WBIO program meets the certification criteria of The Wildlife Society and course requirements for many state and federal fish and wildlife biologist positions. This increases the employment opportunities for graduates, most of which express an interest in continuing their education through graduate school or obtaining a job with state agencies and non-governmental organizations.

8. A plan to increase support for student advising by adding campus-wide professional advisors is in the works. This should increase retention in the program.

9. The students we interviewed expressed great content with the program.

B) Challenges

1. The main challenge for undergraduate teaching in the WBIO program is the increase in class sizes. Average class size for an introductory student in wildlife biology has grown to about 250 students, which complicates the delivery of “flipped classrooms” and Experiential Learning. This is especially acute for courses requiring access to computers (only 2 rooms with 20 computers are available to service at least 30 students each). Unless resolved, these challenges may limit the program’s ability to grow by 100 students.

2. The large number of students in the program also creates articulation bottlenecks. For example, there is currently only one section of the required mathematics course, and no longer a professional writing class for the degree. The 20 students that were arguably some of the top students in WBIO and had not experienced delays in completing their degrees; however, several mentioned being aware of graduation delays occurring for transfer students. Certainly, with such large enrollments in WBIO, the bottlenecks could likely be affecting retention and graduation rates.
3. Currently the WBIO program has only 1 person advising 350 students for course scheduling. This person has no
time to address issues and complaints from struggling students, especially those on academic suspension. This
limits the program’s ability to increase retention.
4. Student retention in the WBIO is relatively low (50-60 students graduate from about 130-150 incoming
freshmen class). In addition, to challenges mentioned above, many students experience difficulties in passing the
rigorous STEM courses (biology, chemistry, and mathematics) in freshmen and sophomore years. In addition, the
program requires a GPA ≥ 2.5 for graduation.
5. Although the program supports several active and vibrant student chapters, the leaders of these groups
suggested that advisors could do more to promote these organizations.
6. Providing more information in the form of training and workshops about job searches, which the
undergraduate students expressed as a need and interest.
7. As with many wildlife and fishery programs, especially in the Rocky Mountain Region, increasing diversity of the undergraduate student body is a major challenge and WBIO is no different.

C) Recommendations for Undergraduate Program

1. Invest in improving teaching facilities and technology. This will alleviate some of the articulation bottlenecks
and increase retention. This will be especially important for the desired growth of an additional 100 students.
2. Ensure enough faculty (or lecturers) are hired to address the teaching needs of additional students, including
coordination with other departments that provide service courses for the program (e.g., chemistry, mathematics).
3. Increase the number of professional advisors either within the program or through centralized university
systems. It is impossible for 1 person to properly advise 350 students let alone 400-500.
4. Increase the number of faculty teaching in the undergraduate program. This will be important to reach if WBIO
is going to grow by 100 students and it will be important for continued faculty engagement in campus visits.
5. To enhance diversity, begin to implement the “plan” outlined in the WBIO Self Study. For example, WBIO has
had recent success in recruiting Native American graduate students, thus the plan to also recruit Native Americans
to the undergraduate program is good. Additionally, the infusion of “traditional ecological knowledge” will help
in retaining students from diverse backgrounds. WBIO should also look for synergistic opportunities to recruit
diverse students, e.g., partnering with other universities in Montana and professional societies.

V. GRADUATE PROGRAM

A) Strengths

1. The WBIO Program currently has approximately 60 enrolled graduate students. This represents 40% growth
from 2014-2015. Recruitment to the graduate program is highly successful; some of the advertisements for
individual M.S. graduate opportunities generate more than 100 applications. This is the result of the high-quality
faculty in WBIO and the research support offered through the endowed chairs.
2. Each semester, WBIO receives 21 teaching assistantships (TA) from the UM Graduate School. TAs are allocated
to students each year. Recipients are selected based on the following criteria: 1. existing students needing a TA;
and 2. academic standing (i.e., meeting degree program requirements).
3. The program produces world-renowned wildlife ecologists and the quality of graduate students and their
research contributed to the #1 ranking in 2016 for North America by Academic Analytics.
4. Interactions among faculty and students are good leading to a productive working environment. The students
we interviewed (about 10) commented on the quality of the faculty and fellow graduate students, which creates
an outstanding and supportive community. An additional attraction to the program is the access to outdoor
activities and opportunities.
5. In recognizing the need to increase ethnic diversity within WBIO, the program has created graduate education opportunities for Native Americans, and in Fall 2019 three Native American students from Salish-Kootenai College were accepted as master’s candidates.

B) Challenges
1. The main challenge for graduate students in the WBIO program is the low salaries provided to those working through the College of Forestry. These salaries amount to $14K for a TA and $16K for a research assistantship (RA) and are lower than provided by other universities in the Rocky Mountain Region. Graduate student stipends in DBS’ Organismal Biology, Ecology, & Evolution Department are more in line with other institutions (e.g., TA salary of $21K and $26K through the PAWNS program). Some faculty in all WBIO units supplement student salaries with grant funds to maintain competitive TA and RA stipends. This creates a two-tier system that can create discontent among the graduate students.

2. Another negative impact on graduate students is the lack of health insurance. Graduate students are forced to spend part of their stipend to pay fees and purchase healthcare. This burden is realized by faculty who then try to increase stipends to cover medical costs, which increases proposal/grant budgets. No medical insurance is covered graduate students, but it is required if registered for 6 or more credits. Students are advised to use the Affordable Care Act (ACA) or purchase UM health insurance for about $5000/yr. Combined with the high costs of housing in Missoula, graduate students (especially those with families) stated that many have difficulty making ends meet.

3. Graduate students also face numerous bureaucratic challenges that restrict their ability to conduct research. Students have to complete timesheets even when conducting fieldwork in remote locations with little access to the web, have to follow inflexible procedures when ordering supplies for fieldwork, and can no longer be issued P-cards and thus cannot directly purchase supplies. Also, procedures are not consistent from year to year, which complicates preparation for and performance of research.

4. Mental health issues and stress seem to be on the rise among graduate students and similar trends have been seen across the nation.

5. The graduate students that we interviewed expressed a concern about the quality and availability of facilities, which has been exasperated by the budget cuts and negatively affects their education program.

6. Some graduate students, noted that the high cost of living has resulted in some leaving UM, which results in a net export of the university’s investment. Lower stipends, especially for FCFC students, is certainly a factor.

C) Recommendations for the Graduate Program
1. Increase and equalize graduate student salaries between colleges. A possible source of funding may be to expand the fundraising campaign currently underway for graduate fellowships. A discussion by all WBIO faculty or an adhoc committee would be useful to examine ways to better standardize graduate stipends across WBIO.

2. Provide, at least, basic healthcare coverage. Other state university systems have had success in negotiating lower costs for health insurance by pooling graduate students across the state. A number of state universities in the Rocky Mountain Region are now covering the cost of insurance for graduate students that register for a minimum number of credits.

3. Simplify the bureaucracy associated with graduate student research especially for those who conduct fieldwork. A workshop including staff and graduate students where these procedures are discussed and refined would be a valuable first step for both parties.

4. Continue to support the WBIO Mental Health Working Group to address graduate student needs, see Outreach section under Faculty Strengths.

5. As with the undergraduate recommendation, continue to implement the WBIO plan to increase overall graduate student diversity.

6. Improve teaching and other facilities (see below).

VI. FACILITIES
Faculty, graduate students, and staff of the WBIO are scattered across 7 different buildings. Many of the buildings are old and have no disability access. Office and lab space are limited especially in older buildings. Graduate students are often housed in separate buildings than their advisors and peers. The proposed new building, which is being advanced as a top priority by the administration, will provide relief for many of these issues and with sufficient size could ensure successful growth of the WBIO program in the future.

As with most universities, classes are assigned through a centralized space allocation process. Nonetheless, the program faces issues with outdated classrooms, labs, and offices; the Forestry building is a good example and appeared to lack disability access. Availability of teaching lab space is limited, especially for computer labs (e.g., WILD 470 – biometry). In particular, capabilities for the computer labs is deficient with only 2 rooms of 20 computers servicing about 30 students per lab section. Computing power should be improved across buildings and classrooms. Faculty, students, and staff noted that IT support within colleges is very good. Creating modern, modularized space that can accommodate variations in lab types would allow flexibility in teaching labs, recitation sections, etc. In addition, moving to a model where students are required to purchase notebooks has been effective at a number of universities. Alternatively, some university IT departments manage “mobile carts” of notebooks that can easily be carted to classrooms across campus for faculty course needs.

The WBIO program has 2 modern facilities, the Forensic lab and Genomic core facility. Both facilities are available to faculty and graduate students, facilitate crossover for genomic and computational work, and foster collaborations with state and federal agencies. Support for these facilities should and the labs provide nice models for how labs can be incorporated into the proposed building.

VII. PROGRAM REVIEW SUMMARY

There is tremendous optimism from faculty, students, staff, and administration about the future of the University of Montana’s Wildlife Biology Program. Internally and externally, this truly interdisciplinary program is highly regarded for its excellence and has a well-deserved reputation as a top national program in wildlife conservation. The backbone of WBIO is its outstanding faculty who excel in teaching, research and service and attract outstanding undergraduate and graduate students. During a time when UM saw tremendous declines in enrollment, the WBIO program has been a bright spot, increasing and maintaining student numbers. In response to a 2018 charge from UM President Bodnar, WBIO has developed a plan to contribute to the university’s stability by growing its program by 100 students. For WBIO to succeed, it will be important for UM to fully support its basic programmatic needs, but also to increase its investment. Based on WBIO’s past record of success, including its ability to attract a large proportion of out-of-state students, this should be an easy decision because there is great potential for a return on investment.

Our report was completed after the COVID-19 virus had spread, resulting in the 2020 global pandemic. We are thus well aware that the resulting economic downturn will likely have negatively impact funding for higher education in the coming year(s). UM is fortunate to have the WBIO program, which will likely continue to attract students and research. The pandemic has forced humanity to pause and has resulted in increased discussion about how human encroachment into fragile ecosystems has led to more contact with wildlife, resulting in increases and spread of zoonotic diseases such as COVID-19. The outcome will likely be increased interest in research on fragmentation of wildlife habitat, legal and illegal wildlife trade and our environment (e.g., there have already been images about the shortterm improvements in urban and global air quality and discussions about the impacts, if any, to climate change). As our economic engines return to normal, there will be renewed interest in determining whether “improved” management of nature should become an integral part of the equation. Fortunately for UM, WBIO faculty are poised to make contributions because they already work in areas of species conservation, global change, population ecology, eDNA, invasive species ecology, and social dimensions and policy of wildlife management. In addition, Montana with its beautiful natural landscapes will continue to be attractive to those interested in enjoying and conserving the outdoors. UM will likely continue attracting students that seek education and learn the skills of
wildlife conservation and ecology. Below, we highlight a few of the key recommendations that we hope will help maintain, and enhance, the Wildlife Biology program in the coming years.

**Recommendations**

1. Establish a base budget for WBIO; this was also a recommendation in the last external review report. Considering the high regard for WBIO, we reiterate that some mechanism for providing a base budget should be a priority. As the proposed new budget process that will incentivize growth should be flexible enough such that interdisciplinary programs like WBIO can also benefit and add to the WBIO budget as enrollment grows. Suggested approaches to create a base budget, including some redistribution of a small percentage of IDC from WBIO in DBS and FCFC, are outlined under the “Challenges & Recommendations: Indirect Cost Recovery” in the “THE WILDLIFE BIOLOGY PROGRAM STRUCTURE” section.

2. Increase support from DBS to ensure continued interdisciplinary nature of the program. This can be achieved through redistribution of IDC.

3. Complete the hiring process for replacement of the WBIO administrative associate position.

4. Hire additional WBIO faculty to ensure teaching is adequately supported, to strengthen key research areas (see recommendations in Faculty section), and to support an increase in enrollment. UM will, of course, benefit through better retention of students and in the generation of more research dollars.

5. Equalize workloads across faculty and staff from all departments and colleges.

6. Provide additional advising support for the current undergraduate enrollment and to ensure success in recruiting, retaining, and graduating the additional 100 students to WBIO in the coming years.

7. Address graduate student concerns about low stipends and lack of health care coverage. Create funds to reduce inequality of pay between graduate students enrolled through different colleges and departments.

8. Broaden diversity, equity, and inclusion efforts of students as suggested under Recommendations for Undergraduate Program, and, although also challenging, expand the discussion in WBIO to include efforts to recruit a more diverse faculty and staff.

9. Remodel existing buildings and continue pursuing the new building to address facility needs for people, teaching, and research. Such improvements will also aid in student and staff recruitment and retention.

10. Although WBIO is a great example of a truly interdisciplinary program, there is a sense that commitment from each college partner is not equal. This impression is based on conversations with faculty and the Deans/Associate Deans for each college. It is also implied by the commitments, or lack thereof, of resources (e.g., office space for the WBIO Director and associated staff and administrative support) from each college over the years. Perhaps, this perception is unfounded, but with Dean searches on the horizon for CHS and FCFC, the timing seems perfect to revisit the original WBIO agreement between the colleges and the Montana Cooperative Wildlife Research Unit with the goal of openly discussing program needs, concerns, and how this wonderful interdisciplinary arrangement should look in the future. A question that could also be included in these discussions is “how best to involve the WBIO Director in leadership/administrative decisions that directly affect the WBIO program”. For example, it is surprising that the WBIO Director, or a representative of WBIO program, is not on the search committee for the FCFC Dean; a position that has tremendous implications for the WBIO program.

Wildlife Biology Report
Graduate Council 2020-2021 Program Review
Approved November 25, 2020

Brief summary of the program:

The Department of Wildlife Biology (WBIO) at the University of Montana is a joint program drawing from faculty and resources from the W. A. Franke College of Forestry and Conservation (FCFC), Division of Biological Science (DBS) within the College of Humanities and Sciences (CHS), and the Montana Cooperative Wildlife Research Unit (MCWRU). The program currently has 35 PhD and 22 MS students. WBIO is a premiere program in the United States receiving a #1 ranking by Academic Analytics in 2016 and is recognized by the University of Montana as a Program of Distinction. WBIO is an outstanding example of a highly successful and truly interdisciplinary program with exceptional faculty that have a strong commitment to teaching, research, and outreach. The department offers courses and has faculty expertise in the following areas of wildlife biology: 1) conservation genetics, 2) quantitative sciences, with an emphasis on population and habitat modeling, and 3) private lands, partner-based conservation.

Based upon your subcommittee's evaluation, please list three strengths of the program.

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<td>Students are taught by professors who incorporate the latest advances in science, research, and technology into their course curricula. The faculty offer significant hands on experience to students by integrating students into their research projects. There is a strong emphasis on experiential learning throughout the curriculum which directly aligns with Engages Students Where They Are and Partnering with Place Priorities of Action.</td>
<td>Beyond the existing interdisciplinary structure, WBIO faculty collaborate with Journalism, Business, Law, and Environmental Studies at UM.</td>
<td>WBIO has a strong donor base, which has been vital to supporting the program in the absence of an operating budget.</td>
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Based upon your subcommittee's evaluation, please list three areas of weakness of the program.

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<td>WBIO Program no longer has an operating budget, relying exclusively on private philanthropy to operate the Program.</td>
<td>Faculty have been asked to take on additional administrative and teaching responsibilities while attempting to sustain large research programs.</td>
<td>Lab and office space is insufficient to support the program.</td>
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Based upon your subcommittee's evaluation, please list three areas of opportunity for the program.
**Opportunity One**
WBIO programs have identified diversity, equity and inclusion as a key priority for recruiting students to their programs.

**Opportunity Two**
WBIO program is exploring opportunities to more directly incorporate partner-based conservation into the curriculum aligning with the “Partner with Place” Priority for Action.

**Opportunity Three**
Strengthen the existing program by adding faculty and expertise in ecology, fisheries, human dimensions, policy, and quantitative ecology.

Based upon your subcommittee's evaluation, please list three potential threats to the program.

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<td>WBIO has been challenged to further increase undergraduate student numbers by 100 in the coming years while operating beyond teaching capacity of faculty, a dire need for more instructors/faculty, and a need for smaller class sizes to promote student retention.</td>
<td>Maintaining high research productivity, which is a strength within WBIO, will be a challenge due to increasing demands on faculty time because of higher undergraduate enrollment, teaching loads, and lack of adequate staff support.</td>
<td>WBIO faculty and staff are overworked. A majority of WBIO faculty serve more than the WBIO Program including: Biology; Organismal Biology and Ecology; Ecosystem Science and Restoration; Parks, Tourism, and Recreation Management; and Resource Conservation.</td>
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Provide 1-3 suggestions for innovative possibilities within the program, including (but not limited to) collaborative/interdisciplinary partnerships, fundraising, and outreach efforts?

WBIO programs have identified diversity, equity and inclusion as a key priority for recruiting students to their programs, which aligns with collaborative partnership initiatives. This could lead to possible financial support and leadership development for graduate students.

Provide suggestions for addressing the weakness or threats noted in the self-study or external evaluators' report?

The recent addition of a full-time WBIO Director of Development in collaboration with the UM Foundation should expand opportunities to secure private funding to support students and faculty. However, additional administrative and teaching resources are warranted to support growth of both the undergraduate and graduate programs.