Assessment reports are to be submitted annually by program/s. The report deadline is September 15th .

The use of this template is optional, however, any assessment report submitted must contain the required information provided in template.

Annual Program Assessment Report

Final (draft 3.4), 9-15-19
Academic Year: 2018-19
Department: Ecology
Program(s) Assessed:

Indicate all majors, minors, certificates and/or options that are included in this assessment:

Majors/Minors/Certificate	Options
Bachelor of Science in Biological Sciences	**Fish & Wildlife Ecology and Management Option**
	Conservation Biology and Ecology Option
	Organismal Biology Option
	Biology Teaching Option

Annual Assessment Process (CHECK OFF LIST)

1. Data are collected as defined by Assessment Plan
   YES___x__ NO_____
2. Population or unbiased samples of collected assignments are scored by at least two faculty members using scoring rubrics to ensure inter-rater reliability.
   YES_____ NO___x__
3. Areas where the acceptable performance threshold has not been met are highlighted.
   YES_____ NO_____ NA__x___
4. Assessment scores were presented at a program/unit faculty meeting.
   YES___x__ NO_____
5. The faculty reviewed the assessment results, and responded accordingly (Check all appropriate lines)
   Gather additional data to verify or refute the result. _____
   Identify potential curriculum changes to try to address the problem _____
   Change the acceptable performance threshold, reassess _____
   Choose a different assignment to assess the outcome _____
   Faculty may reconsider thresholds_____
   Evaluate the rubric to assure outcomes meet student skill level _____
   Use Bloom's Taxonomy to consider stronger learning outcomes _____
   Choose a different assignment to assess the outcome__x___

   OTHER: The faculty discussed reassessing our Assessment Plan

6. Does your report demonstrate changes made because of previous assessment results (closing the loop)? YES__x___ NO_____

1. What Was Done

a) The following learning outcomes were due to be reviewed during this assessment cycle.

Fish and Wildlife Ecology and Management Option

1) Learning Objective #4: Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.

2) Learning Objective #8: Demonstrate awareness of historical, political, economic, and social factors in fish and wildlife management and natural resource conservation.

Conservation Biology and Ecology Option

1) Learning Objective #4: Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.

2) Learning Objective #8: Demonstrate understanding of ecological patterns and processes at levels of organization above the population, including community ecology and ecosystem ecology.

3) Learning Objective #12: Demonstrate an understanding of the methods by which conservation problems are identified and addressed.

Organismal Biology Option

1) Learning Objective #4: Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.

2) Learning Objective #8: Demonstrate the ability to apply the interdisciplinary building blocks to understand integrated problems at the organism level.

3) Learning Objective #12: Identify and declare in consultation with an advisor(s) an academic theme for coursework directed toward a specific career that incorporates biological sciences.

Biology Teaching Option

Outcomes were not assessed this year given the very small number of students (<5), and technical difficulties in gathering data. We focused on the other three options.

b) **Include planning table** – inform if there are changes to the assessment plan.

There are as many as 13 different Learning Objectives for each Option. The first few of those learning objectives are similar, however from there we see LOs that splinter off and are more particular. The plan calls for assessing 10 LOs, 8 of them unique.

Changes: This year, we will not assess LOs for the Biology Teaching Option. Not many students enroll in this option, and hence faculty thought it best to use faculty time and resources to focus on the other 3 options.

Table 1, Assessment Schedule for FWM Option learning objectives.

Learning Outcome	2015-2016	2016-2017	2017-2018	2018-2019
Demonstrate effective written and oral communication.	X			
Demonstrate an understanding of physical and chemical factors that influence organisms, their physiology, and ecosystem function.		X		
Demonstrate the ability to apply quantitative reasoning and appropriate mathematical and statistical methods to describe or explain phenomena in the natural world.			X	
Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.				X
Demonstrate an understanding of the process by which scientific knowledge is generated and evaluated.	X			
Demonstrate a basic understanding of demographic attributes of populations and the natural processes and the abiotic factors that influence population dynamics, as well as direct and indirect anthropogenic influences on populations.		X		
Demonstrate a basic understanding of the variety of interactions among communities of organisms and the integration of communities into ecosystems.			X	
Demonstrate awareness of historical, political, economic, and social factors in fish and wildlife management and natural resource conservation.				X
Demonstrate a basic understanding of fish and wildlife management and conservation techniques.	X			

Table 2, Assessment Schedule for Conservation Biology & Ecology Option learning objectives.

Learning Outcome	2015-2016	2016-2017	2017-2018	2018-2019
Demonstrate effective written and oral communication.	X			
Demonstrate an understanding of physical and chemical factors that influence organisms, their physiology, and ecosystem function.		X		
Demonstrate the ability to apply quantitative reasoning and appropriate mathematical and statistical methods to describe or explain phenomena in the natural world.			X	
Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.				X
Demonstrate an understanding of the process by which scientific knowledge is generated and evaluated.	X			
Demonstrate the ability to use logic and reasoning to evaluate one's own work and the work of others.		X		
Demonstrate understanding of the major areas of population ecology, interspecific interactions and interactions with the physical environment.			X	
Demonstrate understanding of ecological patterns and processes at levels of organization above the population, including community ecology and ecosystem ecology.				X
Demonstrate an understanding of the ways that ecological principles can be used to solve practical problems.	X			
Demonstrate an understanding of current patterns of biodiversity and extinction, and why these patterns are of concern.		X		
Demonstrate an understanding of the ways that natural and human related factors alter population dynamics and extinction risk, community dynamics ecosystem function and evolutionary processes.			X	
Demonstrate an understanding of the methods by which conservation problems are identified and addressed.				X
Demonstrate basic understanding of the ways that economic, legal and social issues affect conservation problems, policies and solutions.	X			

Table 3, Assessment Schedule for Organismal Biology Option Learning Outcomes.

Learning Outcome	2015-2016	2016-2017	2017-2018	2018-2019
Demonstrate effective written and oral communication.	X			
Demonstrate an understanding of physical and chemical factors that influence organisms, their physiology, and ecosystem function.		X		
Demonstrate the ability to apply quantitative reasoning and appropriate mathematical and statistical methods to describe or explain phenomena in the natural world.			X	
Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.				X
Demonstrate an understanding of the process by which scientific knowledge is generated and evaluated.	X			
Demonstrate the ability to use logic and reasoning to evaluate one's own work and the work of others.		X		
Demonstrate use of technology to effectively communicate results of literature reviews, research and analyses, and conclusions			X	
Demonstrate the ability to apply the interdisciplinary building blocks to understand integrated problems at the organism level				X
Demonstrate understanding of the relationship between genetics and evolution and the influence of these disciplines on organismal diversity	X			
Demonstrate an understanding of the hierarchy of biology including the organismal scale and including population, community, and ecosystem ecological processes		X		
Identify and declare in consultation with an advisor(s) an advanced area of biological and/or ecological emphasis based on previous coursework, experience, ability, and interest			X	
Identify and declare in consultation with an advisor(s) an academic theme for coursework directed toward a specific career that incorporates biological sciences				X

Table 4, Assessment Schedule for Biology Teaching Option Learning Objectives.

Learning Outcomes	2017-2018	2018-2019	2019-2020	2020-2021
Demonstrate effective written and oral communication.			X	
Demonstrate an understanding of physical and chemical factors that influence organisms, their physiology and ecosystem function.				X
Demonstrate basic understanding of the major disciplines in biology including general biology, physiology, genetics, evolution, and ecology.	X			
Understand the central concepts, tools of inquiry, and structures of the disciplines and can create standard-based learning experiences that make these aspects of subjects or content knowledge meaningful for students.		X		
Create learning environments that allow all students to be socially and academically successful, by validating students' cultural heritages, integrating their life experiences, and promoting their overall development; demonstrate knowledge, skills, and dispositions to address the instructional responsibilities needed to integrate Indian Education for All across the curriculum in a culturally responsive manner.			X	
Understand and use a variety of instructional strategies to foster students' motivation for learning and encourage the development of students' conceptual understandings and performance/work force skill; use knowledge of effective communication techniques and make appropriate use of educational technology to support planning, instruction, and student learning.				X
Understand and demonstrate use of formal and informal assessment strategies and tolls to direct planning of instruction for the continuous intellectual, social, and physical development of all learners including on-going preformative and summative analysis of student learning, individually, in groups, and in whole class settings; plan lessons and instructional sequences based upon knowledge of subject matter, standards, learning outcomes, students and the community.	X			
Demonstrate the ability to reflect on classroom decision-making with regard to content, diversity, pedagogy and assessment in order to improve teaching and learning; are reflective practitioners that examine their own biases and endeavor to provide equitable educational opportunities for students; demonstrate an understanding that education happens in a context and develop effective relationships with family and community members.		X		

2. What Data Were Collected

a) What were collected to assess learning outcomes listed above? (If multiple programs/minors are included, please indicate if different criteria were used).

Fish and Wildlife Ecology and Management Option
-Data on successful completion of BIOO 310, Comparative Vertebrate Anatomy, F18. (LO#4)
-Data from WILD 401, the capstone course, S19. (LO#8)

Conservation Biology Option
Data were collected from Registrar's Office, showing completion of one of the following:

BIOO 230/310, BIOO 412, BIOB 375/377, BIOB 420, BIOO 415/475/470

Data from BioB 420, Evolution (LO#4)
Data from BIOE 428, Freshwater Ecology, F18, including test scores and a selected short essay question from the final exam. (LO#8)
Data from BIOE 428, Freshwater Ecology, F18, an assignment (LO#12)
Data from BIOE 440, Conservation biology, a review paper, and selected test and final exam questions on biodiversity, and the genetics of *Canis lupus*. (LO#12)

Organismal Biology Option
Data from BIOB 420, Evolution, specific test questions. (LO#4)
Data were collected from BIOO 412 Animal Physiology, F18. (LO#4)

Data were collected from BIOE 499 Senior Thesis/Capstone, F18 (LO#8)

Anecdotal evidence that students have consulted advisor and developed plan. (LO#12)

Biology Teaching Option
No data were collected.

b) How were data collected?
-Instructors & professors contributed data, mainly using grades for assignments and for classes.

3. Explain how Data Were Analyzed

a) Explain the assessment process. Who participated in the process, the nature of the rubric utilized (or other norming methods), and the threshold outcome desired.

The assessment process currently in use is relatively complex. Instructors for each course collected the data, and a member of the Program Assessment Committee participated in the process, sending reminder emails asking for data. Here are tables showing the outcomes, the many indicators from which we choose a few specific representations, the "rubrics" (or measurement devices), and the desired thresholds.

Table 1: Assessment Design for Fish and Wildlife Ecology and Management Option

Fish and Wildlife Management and Ecology Option			
Outcome	**Indicator**	**Rubric**	**Threshold**
Demonstrate basic understanding of the major disciplines in biology including physiology, anatomy, genetics, evolution, ecology, and taxonomy/systematics.	BIOO 230/310 BIOO 412 BIOB 375/377 BIOB 420 BIOO 415/475/470	Successful completion of courses in animal physiology, comparative anatomy, genetics, evolution, ecology, and animal and plant taxonomy	70%
Demonstrate awareness of historical, political, economic, and social factors in fish and wildlife management and natural resource conservation	WILD 301 WILD 401	Quiz 1-5 short answer questions; Midterm-14 T/F, MC, short answer questions Successful completion of courses in conservation biology and fish and wildlife capstone course	70%

Table 2: Assessment Design for Conservation Biology and Ecology Option

Conservation Biology and Ecology Option 2018-19			
Learning Outcome	**Indicator**	**Rubric**	**Threshold**
Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.	BIOO 230/310 BIOO 412 BIOB 375/377 BIOB 420 BIOO 415/475/470	Successful completion of courses in animal physiology, comparative anatomy, genetics, evolution, ecology, and animal and plant taxonomy	≥C-

Demonstrate understanding of ecological patterns and processes at levels of organization above the population, including community ecology and ecosystem ecology	BIOE 370, 455, 428	Selected exam questions	≥70%
Demonstrate an understanding of the methods by which conservation problems are identified and addressed	BIOE 440 BIOE 440 BIOE 428	Review paper Selected essay questions Selected essay questions	≥70% ≥70% ≥70%

Table 3: Assessment Design for Organismal Biology Option

Outcome	Indicator	Rubric	Threshold
Demonstrate basic understanding of the major disciplines in biology including general biology, physiology, genetics, evolution, ecology and systematics	BIOB 160, 170 BIOO 412 or 433 BIOB 375 BIOB 420	Course completion Completion of course entirely devoted to physiology Completion of course entirely devoted to genetics Completion of course entirely devoted to ecology Selected questions on ecology, physiology, genetics and evolution Selected questions on genetics and evolution	≥ C- ≥ C- ≥ C- ≥ 70% correct
Demonstrate the ability to apply the interdisciplinary building blocks to understand integrated problems at the organism level	Capstone course [BIOE 499, Senior Thesis/ Capstone]	Graded presentation of integration of concepts	≥ 70% correct
Identify and declare in consultation with an advisor(s) an academic theme for coursework directed toward a specific career that incorporates biological sciences	Advising Sessions	Documented declaration of biological academic theme and course list	100%

Table 4: Assessment Design for Biology Teaching Option

Biology Teaching Option			
Outcome	**Indicator**	**Rubric**	**Threshold**
Understand the central concepts, tools of inquiry, and structures of the disciplines and can create standard-based learning experiences that make these aspects of subjects or content knowledge meaningful for students.	Praxis II Teaching Practicum FEPA Student Teaching FEPA TWS Graduate Survey Employer Survey	Teaching Practicum FEPA Items 1-4 TWS Section 2 Student Teaching FEPA Items 1-4 Graduate Survey Items 1-2 Employer Survey Items 1-2	
Demonstrate the ability to reflect on classroom decision-making with regard to content, diversity, pedagogy and assessment in order to improve teaching and learning; are reflective practitioners that examine their own biases and endeavor to provide equitable educational opportunities for students; demonstrate an understanding that education happens in a context and develop effective relationships with family and community members.	Signature Assignment Teaching Practicum FEPA Student Teaching FEPA TWS Graduate Survey Employer Survey	Signature Assignment – Relationships (382) Signature Assignment-Reflection (395) Teaching Practicum REPA Items 21-27 TWS Section 6 Student Teaching FEPA Items 21-27 Graduate Survey Item 10 Employer Survey Item 10	

4. What Was Learned

a) Results: The committee was successful in obtaining data for 8 out of our 10 planned LO assessments. Students met the thresholds that are enumerated in the Assessment Plan (see data below).

Fish and Wildlife Option

1) LO#4, Demonstrate basic understanding of the major disciplines in biology including physiology, genetics, evolution, ecology and systematics.

Data were collected from Dr. Varricchio's BIOO 310, Comparative Vertebrate Anatomy, F18.

75 of 87 students (86%) passed the course with a C- or better.

35 out of 37 FWE&M students (95%) passed the course with a C- or better.

We are pleased to see our majors did a little better than the broader field of students taking Vertebrate Anatomy. We have questioned whether, if we have such a broad learning objective, we can measure that with a very specific measure, such as an exam question. A "basic understanding" of a major discipline, such as anatomy, might very well be measured by the completion of a course. The faculty question the idea that a specific question reveals the understanding of a whole area of science (see further discussion below).

2) LO#8, historical, economic, political & social understanding.

Data were collected from Professor Litt's WILD 401, the capstone course, during S19.

56 of 56 (100%) of students completed WILD 401 with a C- or better in Spring 2019.

We would certainly hope that all of our students would pass the capstone course. This may present an opportunity to get a better sense of students' understanding in these areas. However, passing a class that focuses on the development of wildlife conservation plans may not differentiate sufficiently

between the technical aspects and the social aspects of wildlife conservation plans drawn up for the real world. Thus, a more specific measure of the social aspects might be in order.

Conservation Biology and Ecology Option

1) LO#4, understanding major biological disciplines.

--Data were collected by Dr. Matt Lavin, in BIOB 420, Evolution.

Committee member James Pritchard worked closely with Dr. Lavin during Spring 2019, with the result that Dr. Lavin selected five questions from the 4th (and final) exam, Nos. 31-37 (see more detailed information below). On these questions students ranged from 77 to 99% successful, exceeded thresholds.

2) LO#8, understand patterns & processes, above the population level.

-Data were collected by Dr. Lindsay Albertson, in BIOE 428, Freshwater Ecology, F18.

First, Dr. Albertson reports exam average scores, thus: Exam 1- 78.1%, Exam 2- 86.4 %, and Exam 3, 85%, showing a general trend of students becoming more competent with concepts as they progress through the semester.

3) Learning Objective #12, Demonstrate an understanding of the methods by which conservation problems are identified and addressed.

-Data were collected by Dr. Lindsey Albertson, in BioE 428, Freshwater Ecology.

Dr. Albertson did a great job of innovation this semester using two assignments to measure the outcome:

Assignment 2

Carpenter et al. 1999: Find an article in the mainstream media related to nutrients and water pollution, and write a 2-4 paragraph typed response that summarizes 1) the problem discussed in the article and 2) how it relates to what you learned from reading the Carpenter paper. Make sure to include the citation for the article you choose. Note: The Carpenter paper is a primary literature article and DOES NOT count as the mainstream media article that you need to choose. Student grade average: 92.5%

Secondly, Dr. Albertson utilized **Assignment #5**, an essay, in assessing this outcome.

The Question: "Use evidence from [Berhnhardt et al. 2005] to describe 3 successes that have come along with freshwater restoration efforts in the U.S. and 3 problems facing freshwater restoration efforts." This assignment called for a response of 2-4 paragraphs (one page), typed and single spaced.

The student grade average on this assignment was 89.4%, well above the general threshold of 70% or better.

3b) BIOE 440, Conservation Biology, Dr. Brian Smithers, F18

Dr. Smithers used three (3) different measures, with these results:

Review Paper: 100% of undergraduates (18 students) met the objective of a 70% or higher.
Exam questions: 83% of undergraduates (15 out of 18) met the objective of a 70% or higher on the selected questions.
Final Exam: 100% of undergraduates (18 out of 18) met the objective of a 70% or higher on the selected question.

These results meet our thresholds. Our assessment schedule calls for "Selected Essay Questions," with a Threshold of 70% or higher.

On the Midterm exam, Dr. Smithers offered the following questions to assess the LO:

1. What are some of the methods most commonly employed to measure biological diversity at different scales and how are they measured, using equations where appropriate and describing the terms of those equations. What is the relationship among the different levels of biological diversity? Feel free to use graphical support for your answer.
2. What are the major theories that are used to explain differences in local biodiversity? Give support for each theory? What are the downstream effects of each of these philosophies in how we approach conservation?

On the midterm, **83% of undergraduates (15 out of 18) met the objective of a 70% or higher on the selected questions, a good result.**

On the Final Exam, Dr. Smithers offered this as an essay question:

1. Grey wolves in Yellowstone National Park were reintroduced from Canadian stock and included only grey-colored individuals. At some point, a trait for black coats was introduced to the population through a chance breeding with a domesticated black dog. Black coloration has persisted more prevalently than would be expected by genetic principles alone. Based on your understanding of genetic principles and the literature, what is going on with grey and black traits in Yellowstone grey wolves? Why has black coloration persisted in such high proportions? What does this say about assortative mating in wolves? Hybridization? I recommend taking a look at papers by Philip Hedrick, Doug Smith, and/or Tovi Anderson for more background on this issue. Cite appropriate sources.

Dr. Smithers reports that **100% of undergraduates (18 out of 18) met the objective of a 70% or higher on the selected question.**

Organismal Biology Option

1) LO#4, understanding major biological disciplines.

--Data were collected by Dr. Matt Lavin, in BIOB 420, Evolution.

Committee member James Pritchard worked closely with Dr. Lavin during Spring 2019, with the result that Dr. Lavin selected several questions from the 4th (and final) exam, Nos. 31-37.

Q31, 82% answered correctly

Q32, 94% answered correctly

Q 33, 99% answered correctly

Q34, 95% answered correctly

Q35, 77% answered correctly

Here are those 5 questions:

31. Linguists studying the phylogenetics of language groups have determined that the RI of low limit number words (e.g., one, two, three, four, five) is much higher than the RI of gender-neutral and gender-specific pronoun words (e.g., Latino, Latina, Latinx). Word groups with a high RI are most revealing of the true relationships among human language groups: **a.**true, **b.** false. (82% correctly answered)

32. Phylogenetics was developed by systematists (taxonomists) in the 1960's who wanted to classify species according to degree of relatedness using the criterion of monophyly. Since then, epidemiologists,

linguists, and cosmologist have been responsible for helping to advance the methods and theory of phylogenetics: **a.** true, **b.** false. (94% correctly answered)

33. The main processes that shape or evolve populations over evolutionary time scales are: **a.** mutation, **b.** genetic drift, **c.** migration, **d.** natural selection, **e.** all the above. (99% correctly answered)

34. In contrast to natural selection, the processes of mutation, genetic drift, and migration are: **a.** chance (stochastic) processes, **b.** purposeful (deterministic) processes. (95% correctly answered)

35. Natural selection theory, which includes reciprocal altruism, kin selection, and sexual selection theories, predicts that cooperation will evolve in a conditional manner: **a.** true, **b.** false. (77% correctly answered)

Discussion:

The last question (#35) brings to mind the issue, that if we used one question (#35) to assess a learning outcome, we would mistakenly assume students were not comprehending very much. Given that 5 questions provides a better insight, would not 30 questions give an even more accurate picture of student progress? So one could also argue that the use of overall exam scores is the best measure student knowledge and progress.

1b). LO#4, understanding major biological disciplines.

Data were collected by Dr. John Winnie, BIOO 412 Animal Physiology, F18

Dr. Winnie utilized Exam #3 in assessing this outcome. The test average was 78%. Seventy percent (70%) or 85 of 121 students earned a "C-" or better on the exam.

This meets our thresholds.

2) LO#8, apply interdisciplinary building blocks to integrated problems.

BIOE 499 (Dr. John Winnie, S19). We had 17 students enrolled in the capstone course for this option, namely BIOE 499, Senior Thesis/Capstone. The plan calls for a "graded presentation of concept integration."

Everyone in BIOE 499 passed with >70% and that's normal for the class. The instructor stated that he has only given one D and one F in all the semesters he has taught it. [This meets our thresholds].

During the course of the semester each student works on a topic of their choice in the life sciences. Each week they turn in a written summary of a peer reviewed research paper, and once during the semester each gives a presentation on their topic drawing on primary literature. In addition, they each write a review paper on their topic, due at the end of the semester.

At virtually every stage, students are integrating information across 2 or more life science disciplines. They are graded on the clarity and quality of their presentations, weekly summaries, and final review papers. In particular, students' review papers have to knit together information from 12 to 20 studies in a clear, cohesive way that demonstrates a thorough understanding of the chosen topic. The instructor thinks the review papers meet the measure of a "graded presentation of concept integration."

3) LO#12, meet with advisor and declare an "academic theme."

We have 68 students enrolled in the Organismal Biology option. We are confident that over 70% of these students met with their advisor during the last academic year. While students are required to declare an option, we have not developed a formal process for students' declaration of "an academic theme for coursework directed toward a specific career." This learning objective may reconsidered in the next assessment plan.

b) Describe how results were communicated to the department and used to develop plans for improvement.

Results were shared with department faculty at a regular departmental meeting on 3 September, 2019. Faculty brainstormed about the assessment process.

Significantly, of our 8 points of assessment, 4 of them moved toward more specific measures. Two of the classes assessed (out of 7) are in departments outside of Ecology.

A Fundamental Problem is that devising specific measures that are meant to measure the achievement of Program Objectives (which are necessarily quite broad), will present challenges. Many faculty feel that measuring a broad objective with only a couple of questions, or just one assignment, does not do an adequate job. Faculty see completion of a course, or an exam as a legitimate measure of successfully meeting the program objective since that is the legitimate measure by which we measure student success.

One of the faculty in the Ecology Dept. suggested this idea: "every question on every exam contributes to assessing students' mastery of the topic." There aren't really any crux questions, or even a group of questions, that anyone could look at and conclude that yes, successfully answering these means students have a basic mastery of [for example, animal physiology]. The same holds for BIOB 170--one or a few questions will not really be sufficient to demonstrate students' having a basic knowledge of a major discipline within biology." See also Organismal Biology Option LO#4, above on pp. 12-13.

The faculty also discussed synthetic knowledge, and how much we might expect from undergraduates, compared to graduate students.

5. How We Responded

a) Based on assessment, are there any curricular plans for the following year? (Such as plans for measurable improvements, or realignment of learning outcomes).

Most responses center on brainstorming ideas for more specific measures, and teaching techniques that can help students engage with critical ideas in the curriculum.

1) BIOO 310, Comparative Vertebrate Anatomy, F18.

In the interest of developing a more specific measure, the instructor suggests these 3 questions:

Q1. Explain the puzzling morphology of the aardwolf in terms of the concept "Form = Function + Phylogeny". (see illustration)

Q2. Vertebrates are largely composed of the same materials. Diversity in function comes about in part due to the organization of these materials at different levels (i.e. different scales). Provide and explain an example from vertebrate anatomy where this is true.

Q3. 45-48. (4 points). Using the aortic arches and one other example of your choosing from throughout the semester, explain how evolution has worked through renovation to generate various anatomical differences between vertebrate groups.

These questions require students to understand anatomy in a mechanical as well as a phylogenetic/evolutionary way. Our instructor estimates that about 75% of his students get these questions correct.

2) WILD 401. Our instructor is on sabbatical this year.

3) BIOE 428, Freshwater Ecology, F18:

Once the class is offered both semesters and class size is reduced, the instructor is planning to change one of the exams to a group project that will require students to work together, work on communication skills, and work on data synthesis/interpretation. That will take a few years to be put into effect.

Our instructor had some great ideas for future assessments. She selected 2-6 questions from each exam that might be used to assess objectives, if we gave the instructor advance notice. For example, question # 13 from the Final Exam might work to assess student comprehension of patterns & processes. This question asks students to use statistics from lectures in describing the impact of dams on streams and rivers, and in describing major influences on freshwater systems.

4) **BIOE 440, Conservation Biology, F18.**

In assessing Conservation Biology Learning Objective #12, Demonstrate an understanding of the methods by which conservation problems are identified and addressed, our instructor used a review paper, selected exam questions, and one question from the final exam.

5) BIOB 420, Evolution.

In this class, our instructor has contributed 5 exam questions to assess student achievement of learning objectives. We discussed the instructor's idea that using one question to assess student success leaves something to be desired. Faculty in other departments and colleges, not just our department, are puzzled by the idea that one or a few questions can assess the achievement of learning objectives.

6) BIOO 412, Animal Physiology, F18.

The instructor reports he is always revising Animal Physiology, trying to add current issues or examples that help illustrate content or concepts that he is covering in the class. This year, he is making a bigger effort to bring in a greater variety of animals to spark more interest in each topic. He is also looking for more good video clips, which thanks to BBC are becoming more plentiful.

The Program Assessment Committee's Response:

One important way we have responded is by forming a Program Assessment Committee to work on program assessment. Committee members have invested significant energy in getting up to speed on the assessment process, for example attending workshops organized by the Provost's Office and the Center for Teaching Excellence. We have learned, for example, that in the future, we need to get way out in front in requesting data from professors, even before semesters get underway. We will be wrestling with some basic changes in how we assess student success, as we revise our assessment plan.

A representative of the Committee has participated in two assessment workshops sponsored by the Provost's Office over the last year. We learned quite a bit about the assessment process. The current assessment program for the Ecology Dept. was created about 2010. At the time, the assessment designed was what was considered appropriate. However, it now appears that the assessment system is more complex than necessary. Secondly, over time the university has made some changes in how we might best assess programs (e.g., the new template for Sept. 2018), and we are keen to bring our assessment more into line with current best practices. The major difference here is our current method of assessing an outcome using completion of a course, or passing an exam. Program assessment seems to be heading toward more particular or specific measures of outcome achievement.

The Program Assessment Committee presented to the faculty their opinion that the process we have in place is more cumbersome than it needs to be, and argued that a simpler system of assessment could be just as effective and actually more informative to the faculty. Currently, we have 27 individual learning objectives, with as many as 13 different Learning Objectives for one option. Some of those are similar. We have up to 11 different indicators to measure the outcomes for each option. While it is good to have options for assessment, we propose to step back and evaluate which ones the faculty might consider better measures, or more easily assessed. The Committee feels that developing a simpler system might be an improvement.

The Program Assessment Committee will bring to the faculty a timeline for revising our Program Assessment Plan. To begin that process, we note that fewer learning objectives would be desirable. Future discussions will focus on the consolidation (realignment) of learning objectives that we currently have. Secondly, we will meet and discuss how to map classes to the curriculum. Third, we will meet and discuss some specific ways to measure outcomes. The annual faculty retreat in October will present an opportunity for the Program Assessment Committee to communicate with the faculty. We could refine our timeline for re-organizing our Program Assessment Process, brainstorm ideas on our consolidated Learning Objectives common for all the options, and solicit ideas on assessment & curriculum.

Dr. Kalinowski has an idea to create a series of questions that could be given to freshman, and graduating seniors to assess their learning of scientific concepts. The faculty supported this idea.

The Ecology Department's Program Assessment Committee requests a one-year hiatus in the regular program assessment to devise a new Program Assessment Plan.

b) When will the changes be next assessed?

During the 2019-2020 academic year, the department will develop a new system for program assessment. The new assessment plan will be presented at the next program report due date, September 15, 2020.

6. Closing the Loop

a) Do any of the outcomes this year represent improvements based on assessment from previous years (show multi-year use of progress).

Our 2017-18 Report was sent back to us with a request that we use the new Template. We **revised and rearranged** our report to fit into the new template and reporting format. Consequently, our department communicated with MSU's Interim Assistant provost for Assessment and Curriculum Management, who gave us some guidance on revising our Program Learning Objectives, specifically for the Bachelor of Science, Conservation Biology Option. This discussion will influence our revision process. We shared our ideas for revisions with the Assistant Provost during January of 2019.

An excellent **example of revisions in our assessment** can be found in BIOE 440, Conservation Biology (F18), where in assessing Conservation Biology Learning Objective #12, our instructor moved into an assessment method utilizing more specific measures. A second example, in which we are asking faculty from a different department (and college) for more specific measures, compared to last year, is BIOB 420, Evolution.

Our activity in reviewing our Assessment Plan, attending workshops in 2018 & 2019, reviewing the assessment plans and reports from other departments at MSU, as well as assessment at other universities, has been instructional for the Ecology Department, and we look forward to making our assessment process in the coming year useful to the faculty, as well as the university.