Academic Program Review

Self-Study Report

Name of Program: Biology

Name of Program Chair: Amy Wolf

Date of Last Program Review: May 2008

Date the Current Self-Study Report approved by Program Executive Committee:

Section A. Mission Statement and Program Description

State your program's mission, describe its requirements and explain how they relate to UW-Green Bay's select mission and the institution's overall strategic plan. Note any changes that have been made to your program mission and requirements since the last review. Then provide a description of your program's curricular strengths and areas in need of improvement.

1. Introduction and Mission Statement

The Biology Program at the University of Wisconsin-Green Bay is a non-budgetary academic unit that offers students a major and minor in the broad based discipline of biology, the study of life and living organisms. The curriculum provides insights into living systems from the sub-cellular level to the ecosystem level. The Biology major prepares students for careers in cell and molecular biology, biochemistry, plant and animal biology, genetics, microbiology, physiology, ecology, science education, and field biology. A wide range of courses is available, including all of the appropriate undergraduate courses in preparation for graduate studies or professional schools in medicine, dentistry, veterinary science, and other health-related fields. The major also establishes a foundation for interdisciplinary careers in resources management, wildlife ecology, ecosystem studies, fisheries, forestry, population ecology, environmental consulting, and environmental education.

The University of Wisconsin-Green Bay's select mission aims to provide an interdisciplinary, problem-focused educational experience that prepares students to think critically and address complex issues in a multicultural and evolving world. The Biology Program contributes to this mission through its formal curriculum, internships as well as through ongoing faculty research and community outreach activities. Biology faculty and staff, including employees of the Cofrin Center for Biodiversity, provide outstanding opportunities for students to engage in hands-on problem solving experiences at local, regional, and even international scales.

This program review introduces a revised mission statement for the Biology Program, building from recommendations by the AAC's 2009 Biology Unit Program Review and subsequent discussions by the Biology faculty:

The Biology Program at the University of Wisconsin-Green Bay provides a quality educational curriculum in the study of life and living systems, from the molecular level to the ecosystem level. The disciplinary major and minor complement UW-Green Bay's interdisciplinary programs, especially those in Human Biology, Environmental Science, and the professional program in Education. The biology major prepares students for careers in ecology, organismal biology, physiology, genetics, cell and molecular biology, medicine and human health, veterinary science, wildlife management, education,

agriculture, and science communication. Faculty and staff teach students to think critically and to solve complex problems scientifically by providing hands-on laboratory and field experiences as well as meaningful scientific research opportunities. The Biology Program contributes intellectual, cultural, and economic outreach activities and scientific research that enriches the quality of life for people in northeastern Wisconsin and elsewhere.

2. Program Requirements

Biology majors must combine their studies with an interdisciplinary minor or major. Human Biology is commonly chosen as a minor by Biology majors with interests in pre-medicine, health sciences or exercise science. Students interested in ecology, biodiversity conservation, and management of biological resources such as wildlife, forests, and fisheries, typically combine a minor in Environmental Science. Other popular interdisciplinary subjects for Biology majors include Business Administration and Environmental Policy and Planning.

Students who prefer a Biology minor (rather than a major) must select an interdisciplinary major. Most students with a Biology minor choose majors in Environmental Science or Human Biology. Students who desire to become science teachers often combine the Biology major with the professional program in Education.

Students can customize their academic plans by selecting one or more of 4 emphases: animal biology; cell and molecular biology; ecology and conservation biology; and biology for educators. These tracks prepare students for a wide variety of interdisciplinary careers in resource management, fisheries and wildlife biology, health sciences, genetics, microbiology, science communications (technical writing, journalism, and nature interpretation), and many other fields. About 40 percent of Biology graduates pursue advanced degrees in graduate or professional schools in medicine, dentistry, veterinary science, biological sciences, wildlife biology, or ecology and conservation biology. Students at UW-Green Bay also can combine a Biology degree with a program in primary or secondary school education.

3. Program Description

The Biology faculty include members from both Human Biology and Natural and Applied Science interdisciplinary budgetary units.

Mathew Dornbush, Professor, (Assistant Vice Chancellor and Director of Graduate Studies)
Michael Draney, Professor
Patrick Forsythe, Assistant Professor
Lisa Grubisha, Assistant Professor
Craig Hanke, Associate Professor, (Assistant Dean for Curriculum at the Medical College of Wisconsin-Green Bay, but maintains teaching affiliation with UW-Green Bay)
Robert Howe, Professor, (Director of the Cofrin Center for Biodiversity)
James Marker, Associate Professor
Brian Merkel, Associate Professor
Daniel Meinhardt, Associate Professor
Gary Miller, Professor (Chancellor)
Paul Mueller, Assistant Professor
Uwe Pott, Associate Professor
Donna Ritch, Associate Professor (Associate Dean)
Amy Wolf, Professor

Note that several members of the Biology discipline have full or partial administrative roles, so have reduced teaching loads. NAS is currently in the process of hiring a Plant Biologist and HUB is searching for a Biochemist and an Endocrinologist/Reproductive Biologist – all 3 new hires will join the Biology disciplinary faculty.

Biology continues to be one of UW-Green Bay's most popular and successful academic programs. In addition to the availability of a rigorous undergraduate biology curriculum, students in UW-Green Bay's Biology program have outstanding opportunities to gain practical experience under the guidance of faculty mentors. Many undergraduates work with faculty on field or laboratory research projects. Internships are widely available with private industry, public agencies, the Cofrin Center for Biodiversity, and non-profit organizations. These hands-on experiences are critical for developing a competitive resume for the job market or admission to graduate and professional schools.

The Biology program has well-equipped laboratories for coursework and faculty-guided research. In cellular and molecular biology laboratories, students become familiar with techniques of tissue culture, in situ hybridization, affinity chromatography, agarose and polyacrylamide gel, electrophoresis, polymerase chain reaction, and the use of monoclonal antibodies. In physiology laboratories, students learn techniques to study physiological functions. Teaching and research facilities available to ecology and conservation biology students include the Cofrin Center for Biodiversity, the 290-acre Cofrin Memorial Arboretum surrounding the UW-Green Bay campus, four off-campus natural areas managed by the University, the Richter Natural History Museum, small animal laboratory, the Gary A. Fewless Herbarium, a greenhouse, and state-of-the-art computer labs. Advanced undergraduates are able to participate in research projects on Great Lakes ecosystems, northern forests, agroecosystems, rivers, lakes, wetlands, and even tropical forests and mangroves.

Students in the Biology major develop basic skills such as proficiency in statistical design and analysis, ability to conduct laboratory work, and familiarity with major taxonomic groupings of plants, animals, and microorganisms. Many professional occupations today require a college-educated individual who can write and speak well, solve problems using a scientific approach, learn new information quickly, and work well with others on a team. UW-Green Bay's Biology students acquire and apply these skills with excellence.

Graduates of UW-Green Bay's Biology program are employed today in government agencies (U.S. Environmental Protection Agency, Food and Drug Administration, Fish and Wildlife Service, Forest Service, Bureau of Land Management, Department of Agriculture, Wisconsin Department of Natural Resources, local government agencies); hospitals and clinics, including veterinary hospitals and zoos; private corporations (pharmaceuticals, food processing, agriculture, etc.); environmental consulting firms; conservation organizations; and educational institutions ranging from elementary schools to universities. A PowerPoint presentation highlighting career tracks of 50 graduates of the Biology and Environmental Science programs was developed for the 2015 UW-Green Bay Science Fair. This review demonstrated that many of our graduates are established leaders in public and private sectors of the workforce, including government agencies, universities, small businesses, large corporations, health care facilities, and other institutions.

4. Changes to the Curriculum since 2009

Several curricular changes have been implemented since approval of the most recent (2009) Biology Program Review. Supporting courses and upper level required courses, identical across all areas of emphasis, have not changed during this period. However, the 4 areas of emphasis (Plant Biology, Animal

Biology, Field Biology and Ecology, and Cell/Molecular Biology) described in the 2009-10 undergraduate catalog have been reduced to 3 (Animal Biology, Ecology and Conservation, and Cell/Molecular Biology) by combining Plant Biology and Field Biology and Ecology into a single area of emphasis (Ecology and Conservation). A fourth area of emphasis, Biology for Educators, is now recognized in the undergraduate catalog; this is a general program that includes electives from all 3 of the other areas of emphasis. In all current areas of emphasis, the required number of upper level electives has been increased from 9-10 to 12-14. The total number of credits required for a major in Biology now consists of 28-29 in supporting courses and 30-33 in upper level courses (previously 27-28). An additional 1 credit Biology Seminar (Biology 490) is now required of all Biology majors. This course, taken during the senior year, provides a capstone experience by introducing students to academic and professional infrastructures, career opportunities, and major conceptual issues in the biological sciences. Students work in teams to present background information and facilitate discussions about "cutting edge" ideas and discoveries in the field of biology. This exercise addresses interdisciplinary, problem focused elements of biology and requires students to communicate effectively with their peers. An assessment of student learning outcomes and a general assessment of the Biology Program are also part of this course. We are currently in the process of submitting this course for consideration as a General Education Capstone course.

Both Biology 201 and Biology 203 are included as Biological Sciences General Education offerings. Biology faculty also contribute to the General Education curriculum by teaching courses in the Natural Sciences General Education offerings (Introduction to Environmental Sciences) and Sustainability Perspective courses (Environmental Sustainability, Conservation Biology, Human Disease and Society, Biotechnology and Ethics and Fertility, Reproduction and Family Planning).

New courses added to the curriculum include Environmental Microbiology (Biology 322), Biology Seminar (Biology 490), Ichthyology (Biology 341), and Stream Ecology (Environmental Science 401), which replaces Aquatic Ecology (Environmental Science 405). Ecological and Environmental Methods and Analysis (Environmental Science 467), an elective for the Ecology and Conservation Biology Emphasis, has been renamed Capstone in Environmental Science.

5. Program Strengths

Program strengths include unique features of the curriculum, outstanding facilities, a wealth of research opportunities, and a strong tradition of teaching excellence:

- UW-Green Bay's Biology Program has retained (and in fact increased) the array of taxon-specific courses such as Plant Taxonomy, Entomology, Invertebrate Biology, Ichthyology, Ornithology, and Mammalogy, providing Biology students with opportunities to acquire in depth, example-rich knowledge about biodiversity and functional biology. Students in the Animal Biology and Ecology and Conservation Biology emphases benefit directly from the availability of these courses.

- Outstanding facilities are available for hands-on learning by Biology students at UW-Green Bay. The Cofrin Center for Biodiversity manages five University-owned natural areas, including the 290 acre Cofrin Memorial Arboretum surrounding the campus. These sites are used extensively for field exercises, student research projects, and faculty research. The 182 acre Point au Sable Nature Preserve, located just 4 miles from the UW-Green Bay campus, is a hub of ecological restoration in the Lower Green Bay and Fox River Area of Concern. Projects at Point Sable have engaged students and faculty in meaningful environmental resource management activities funded by public and private grants. The Wabikon Forest Dynamics Plot in the Chequamegon-Nicolet National Forest of northern Wisconsin is part of a global network of 62 forest research

sites coordinated by the Smithsonian Institution's ForestGEO program. UW-Green Bay Biology students have been an integral part of research at this site since its establishment in 2008. The Laboratory Science Building was remodeled in 2003, providing excellent lab facilities for student research both in and out of the classroom. Under the guidance of faculty, students are able to use modern equipment and lab space for studies in microbiology, animal behavior, molecular genetics, insect taxonomy, and other fields of investigation. The Richter Museum of Natural History and Gary Fewless Herbarium provide additional opportunities for students to gain valuable experience in taxonomy and museum science. These and other hands-on resources are matched by few public institutions of UW-Green Bay's size.

- Student assessments consistently identify the quality and commitment of faculty as a strength of UW-Green Bay's Biology Program. As they are elsewhere at UW-Green Bay, standards for student evaluations in Biology courses are high, with median overall course ratings usually ranging from 8-10 where 10 is the maximum score. Several Biology faculty have been nominated for student nominated teaching awards, and Wolf received the first of these awards in 2010.

- Students in the Biology Program have many opportunities for internships and independent studies, both on-campus and off-campus. The geographic location of Green Bay makes it an important site for Great Lakes research, and faculty grants have provided a steady stream of funded opportunities for projects involving habitat restoration, fish ecology, and coastal wetlands. The Cofrin Center for Biodiversity hires students for Richter Museum and Fewless Herbarium operations, externally-funded projects, and ongoing natural areas management. During fall semester 2015, for example, 19 students were employed by the Center, providing hands-on training opportunities that add significantly to the academic portfolios of graduating students. The importance of Green Bay as a regional center for health care provides other important opportunities for students to gain volunteer or paid internships in preparation for post-graduate training in medicine or other health professions. Ongoing collaborations of Biology faculty with the Smithsonian Institution, Bay Beach Wildlife Sanctuary, NEW Zoo, and other institutions have provided continued opportunities for internships and employment during both summer and the academic year.

- International travel courses have become an important part of the undergraduate experience for many UW-Green Bay Biology students. An annual, subsidized field course to Panama was initiated in 2008 by the 1923 Fund, a philanthropic foundation of Dr. David and Mary Ann Cofrin. This course visits facilities of the Smithsonian Tropical Research Institute during the winter interim, usually in collaboration with faculty and students of St. Norbert College. Biology faculty including Draney, Howe, Medland (ad-hoc) and Wolf have been instrumental in developing and leading this travel course. Funding from the 1923 Fund reduces costs so that student typically pay about half the full cost of the trip. Faculty members Matt Dornbush, Kevin Fermanich, and Daniel Meinhardt have developed a winter trip to Costa Rica in collaboration with staff at Carara National Park. The trip was conducted annually for over a decade, although it was not offered during 2015-16. A natural history field course to Australia was offered in 2013 by Robert Howe and Amy Wolf, and Biology students have participated in a variety of travel courses to other countries offered by UW-Green Bay faculty in other academic programs.

- Several specific areas of academic excellence have been developed in the UW-Green Bay Biology Program, as demonstrated by external research grants, acquisition of special equipment (boats, an all-terrain vehicle, thermal cyclers, GPS receivers, trail cameras, bat detectors, etc.) and peer-reviewed publications. Dr. Patrick Forsythe's successful establishment of a fisheries research program at UW-Green Bay is a very recent example of such an area of excellence. Research in ornithology, under the leadership of Dr. Robert Howe, has been a highly successful area of excellence for decades, attracting hundreds of thousands of dollars in grant funding during

the past 10 years. The three most recent Founders Association Awards for Excellence in Scholarship have recognized faculty in the Biology Program: Dr. Michael Draney (2013) for his research on spider taxonomy, Dr. Amy Wolf (2014) for her research in forest ecology, conservation and native pollinators, and Dr. Mathew Dornbush (2015) for his work on soil ecology and ecological restoration. (Howe received the Founders Award for Excellence in Scholarship in 1992.) Microbiologist Dr. Lisa Grubisha has begun to establish an externally funded (USDA grant) lab in next generation DNA sequencing, an area that also is pursued by newly-hired Herbarium Curator Dr. James Horn in his ongoing (published) research on plant systematics. Dr. Paul Mueller is building his research lab where he will offer opportunities to study cell cycle regulation and developmental biology. While these ongoing research activities are important in their own right, they also provide many opportunities for student involvement as field assistants, lab assistants, and student researchers.

- Biology faculty (Dornbush, Draney, Forsythe, Grubisha, Howe and Wolf) are also very active in the ES&P Graduate Program where they teach courses, serve on committees and advise graduate students.

6. Areas in Need of Improvement

The new Biology Seminar has provided valuable information about students' satisfaction with the Biology Program as well as insights into the learning outcomes in upper level Biology students. Based on results from student surveys in the seminar and feedback from other students and staff, several areas have been identified where improvements are needed.

- Periodicity of upper level classes is a source of frustration for some students. Many upper level electives are typically offered only once a year or sometimes every other year. Limited availability and scheduling conflicts prevent some students from enrolling in courses that they otherwise would take. Increasing the periodicity of some of our upper level courses is important.
- A number of upper level Biology courses with laboratories are designated as 3 credit courses, even though they include a 3 hour lab period in addition to 2 hours of traditional lectures. One of the most frequent complaints of students on evaluation forms for these courses is that the amount of work exceeds that of other 3 credit courses. The issue is exacerbated by the fact that newly added courses in stream ecology and ichthyology are 4 credits, creating an inconsistency that needs to be addressed.
- Technologies in most areas of biology are developing rapidly, resulting in ongoing needs for upgrading equipment and course content. Replacing outdated equipment and classroom materials will be a never-ending challenge in the Biology Program.
- Important equipment needs include the following.
    - Plant physiology lab equipment is non-existent or extremely outdated.
    - Lab space and lab equipment are inadequate to meet the needs of the new Environmental Microbiology course and multiple lab sections of Microbiology. A new BSL2 safety cabinet for Microbiology and Mycology courses, in particular, is necessary.
    - Additional equipment for teaching modern molecular biology techniques is needed, including additional micropipets, centrifuges, and qPCR kits and computer updates.
    - Field courses in Ecology, Mammalogy and Ornithology use equipment (binoculars, bat detectors, calipers, meter tapes. etc.) that requires periodic replacement. Some of this equipment is currently in disrepair and will require upgrades in the near future. Technological advances in field biology also have introduced new equipment such as programmable audio recorders and software that are used widely by professionals today. Students will benefit greatly by exposure to these tools. Funding for these items will be pursued during the next assessment period.

- Identification books that go beyond the course textbook for courses such as Mycology are needed.
- We really need a refrigerated centrifuge and compatible rotors for cell and molecular biology labs. The unit that we had been using for teaching labs and research “died” last year and is too old to repair (~25 years old). We are currently using an "emergency backup centrifuge", but that is not fully functional (we can't fully adjust the temperature setting) and this unit is about 40 years old and will not last long.
- Relocation of our current tissue culture hoods into a dedicated tissue culture room would improve the research and teaching space in LS. We have 2 tissue culture hoods: one in LS 305 and the other contributed by Paul Mueller from his previous research program. These hoods should ideally be moved into an area that is dedicated to vertebrate tissue culture work. The current setup is counterproductive and limits what can be accomplished in LS 305; for example, tissue culture work cannot be done in the same area as microbial work. Setting up this dedicated area will increase our research capabilities and help us attract and retain top-notch faculty and students.
- In order to continue to offer hands-on research experiences for students, 6-12 Leica dissecting scopes are needed in the LS 213 field biology lab.
- Several faculty members would be able to use the SEM for biological work if we had a critical point dryer. Currently none of us are able to use this instrument for biological work.
- Software for constructing automontages from microscope camera images is needed to support research on small organisms (less than 1 mm) or tissue samples.

Section B. Student Learning Outcomes Assessment

Describe the program's intended student learning outcomes and the methods used to assess them. Analyze the assessment results and describe the conclusions drawn from that analysis. Finally, describe what specific actions were taken as a result of the assessment of student outcomes learning.

Learning Outcomes

We revised our learning outcomes since the last review. The new student learning outcomes are:

1. Describe the organization and diversity of life at levels of complexity from subcellular to ecosystem.
2. Demonstrate an understanding of genetic information, hereditary processes, and their relevance to evolutionary change as a product of mutation and natural selection
3. Explain the important processes and pathways that sustain living organisms including functional systems for exchange of energy and matter
4. Solve problems by applying a scientific process of inquiry, including the effective use of appropriate techniques, instrumentation, and data analysis
5. Identify and interpret findings of scientists and communicate results of scientific work to others in the scientific community and the general public

We developed an assessment plan which consists of assessing one learning outcome annually (Table 1). For the most part we will be using embedded assessment techniques. Faculty have identified courses where each outcome is addressed, where the assessment will occur, and which faculty members will administer the assessment. Once we have completed assessment on all 5 learning outcomes, we will rotate through them again. We will address deficiencies as they arise. We are all relatively inexperienced with evaluation of assessment outcomes and could benefit from a training workshop by an expert in assessment. The Chair of Biology will be responsible for compiling results from assessors and competing the annual assessment report.

Table 1. Biology Student Learning Outcome Assessment Plan**.**

Learning Outcome	Assessment techniques	Courses Addressed	Courses Assessed	Assessor	Assessment Period
1) Describe the organization and diversity of life at levels of complexity from subcellular to ecosystem	Embedded assessment	Bio 201/202 Bio 203/204	Biology 201/202 Biology 203/204	Pott Grubisha	2015-2016
2) Demonstrate an understanding of genetic information, hereditary processes, and their relevance to evolutionary change as a product of mutation and natural selection	Embedded assessment	Genetics Evolution Bio 201 & 203 Ecology	Biology Seminar Ecology Genetics	Howe Wolf Pott	2014-2015
3) Explain the important processes and pathways that sustain living organisms including functional systems for exchange of energy and matter	Embedded assessment	Plant Physiology Animal Physiology	Plant Physiology Animal Physiology	TBD	2017-2018

4) Solve problems by applying a scientific process of inquiry, including the effective use of appropriate techniques, instrumentation, and data analysis	Embedded assessment	Bio 201 & 203 Ecology Microbiology Many upper level elective courses	Cell Biology Lab (Biology 308) Advanced Microbiology Lab (Biology 402)	Johnson Merkel	2013-2014
5) Identify and interpret findings of scientists and communicate results of scientific work to others in the scientific community and the general public	Embedded assessment: Results from oral presentations and scientific reports	Bio 201 & 203 Ecology	Ecology	Wolf	2016-2017

Assessment results are available from 2013-2014 and 2014-2015.

Biology Assessment Results from 2013-2014

Leaning outcome 4 was assessed: Solve problems by applying a scientific process of inquiry, including the effective use of appropriate techniques, instrumentation, and data analysis.

Embedded assessment in two upper level courses was used.

Cell Biology Lab (Biology 308, Professor Warren Johnson), Spring 2014

Students were assessed for their ability to perform scientific inquiry and interpret the data for 1) colorimetric quantitative assays for protein, DNA, and RNA, 2) SDS-PAGE of protein samples, 3) Agarose Gel electrophoresis of nucleic acids, 4) stain and analyze blood cells, 5) prepare and analyze spinach chloroplasts, 6) prepare and analyze nucleosomes, and 7) perform a Western blot analysis of a protein sample. All 18 students in the course accomplished all seven of these at grade level A.

Advanced Microbiology Lab (Biology 402, Professor Brian Merkel), Spring 2014

Students were assessed for their ability to discuss, apply and interpret the data for 1) Mammalian cell culture system for evaluating T helper cell activation by B a lymphocyte hybridoma, 2) Mammalian cell culture system for measuring superoxide anion production by a human promyelocytic neutrophil cell line, 3) Enzyme-Linked Immunosorbent Assay (ELISA) for Interleukin 2 (IL-2), and 4) Identifying bacteria of clinical concern from the skin, throat, urine and gut of humans.

Achievement Level	Number of Students	Percentage of Students
Excellent	19	83
Very Good	3	13
Good	0	0
Above Average	0	0
Average	0	0
Below Average	0	0

Poor	1	4
Unacceptable	0	0

The faculty discussed the data during fall 2014 and decided that this learning objective is being met not only in the classes where assessment occurred, but in numerous other upper level courses, so no further action is required. All Biology majors will have multiple opportunities during their degree to "solve problems by applying a scientific process of inquiry, including the effective use of appropriate techniques, instrumentation, and data analysis." We will implement assessment for this learning outcome in other upper level courses next time it is reviewed in order to rotate through multiple courses within our curriculum where this objective is met.

Assessment Report 2014-2015

Our goal this year was to evaluate Biology Learning Outcome 2: **Demonstrate an understanding of genetic information, hereditary processes, and their relevance to evolutionary change as a product of mutation and natural selection.**

Our initial plan was to evaluate this learning outcome with imbedded assessments in several core courses, but we discovered a more systematic approach described in a recent thesis by Jaksetic (2012) and a related, earlier paper by Nehm and Reilly (2007). This new approach was desirable because it provides quantitative data for comparisons with results from students in at least one other institution (Bowling Green State University) and it covers a wider range of concepts associated with Learning Outcome 2.

Three questions were given to students in the required course, Biology Seminar (BIOLOGY 490) during spring semester 2015. These questions, designed by Jaksetic (2012) and colleagues in order to assess students' understanding of genetic variation, natural selection, and the relationship between the two.

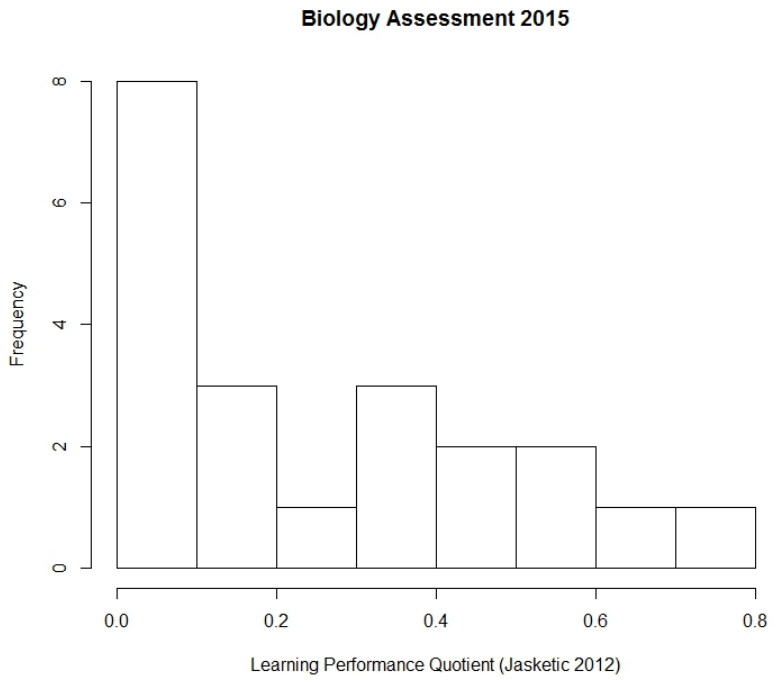
As part of her PhD dissertation at Bowling Green State University, Jaksetic developed a scoring system that takes into account each student's use of key concepts identified by Hawley et al. (2011). Students' were penalized for using incorrect concepts. Example of key concepts include 1) DNA contains instructions for building proteins; 2) Mutations can lead to changes in protein function; and 3) Some of the variation in natural populations is heritable. The index used for scoring (Learning Performance Quotient or LPQ) used the following formula:

$$\text{LPQ} = \frac{\text{\# of key concepts}}{\text{\# of key concepts + alternative concepts}} \times \frac{\text{\# of key concepts}}{\text{total possible key concepts (=10)}}$$

A perfect score of 1.0 is obtained by including all of 10 key concepts with no alternative or incorrect concepts.

Results

The mean LPQ of UWGB students in the spring 2015 Biology Seminar (n=22) was 0.265, within the ranges of 0.21 and 0.29 for students at Bowling Green University. Only 10 students, however, scored higher than 0.2, suggesting that a majority of students performed very poorly on this assessment.



Clearly, these results indicate that many students in our program have a poor grasp of the concept of evolution and the relationship between genetics and natural selection at the time they completed the assessment. Although students in Biology Seminar are juniors and seniors, we have no information regarding their academic histories. Some of these students might not have taken core courses such as Evolutionary Biology, Genetics or Principles of Ecology, where key concepts would have been covered. Biology Faculty are not convinced that these results reflect lack of student learning, and believe that changing the assessment plan to implement assessment directly into the core courses identified (Table 1) would provide more accurate results on student learning. The action we have decided on will be to implement the assessment in core courses next time, rather than in the capstone course. If results are consisted, we will devise a strategy to improve teaching of these critical concepts.

Comments on Biology Assessment

For the first time ever the Biology Program has a systematic plan for assessing specific learning outcomes. Implementation of the plan, however, is still under discussion and further development. Current approaches using imbedded assessments in upper level courses vs. assessments in the Biology Seminar have yielded conflicting results. At one extreme, assessment of learning outcome #4 (ability to perform scientific inquiry and interpret data) resulted in successful achievement at an “A” grade level by all 18 students in Dr. Warren Johnson’s Cell Biology course. By contrast, a majority of students in the Biology Seminar performed poorly in an assessment of learning outcome #2 (an understanding of genetic information, hereditary processes, and their relevance to evolutionary change). The latter results are consistent with findings from an independent investigation using the same methods at Bowling Green University. The idea that all students will successfully achieve all learning outcomes at an “A” level seems unrealistic, no matter how effective the curriculum and pedagogy. Likewise, student achievement of learning outcomes won’t be all or none; different students will achieve different degrees of learning. Hence, measuring learning outcomes can’t realistically be measured as success or failure. The best we can do is to obtain some meaningful signals about the degree of student achievement in different areas of biology. Results subsequently can be used to guide curricular or pedagogical improvements. We will

continue to do this with the information that we are able to gather through assessment. In our most recent assessment from the Biology Seminar, we clearly can see that students need to be exposed to important (but complex) concepts like evolutionary genetics multiple times, and even then some students are likely to miss important elements of the desired learning outcomes.

Section C. Program Accomplishments and Student Success

Describe your program's major accomplishments and student successes since the last Academic Program Review (e.g., internship program; enrollment increases; student achievements, awards, publications, and presentations; faculty scholarly activity, graduate school admission, diversification of students and faculty; program and faculty awards). Also describe faculty and staff professional development activities and how they impacted your program.

Biology offers many internship opportunities for our students, and faculty have strengthened partnerships with community organizations in order to sustain and improve these opportunities. For example, we have established an ongoing relationship with the Green Bay Wildlife Sanctuary, which provides internships in animal rehabilitation, nature-based education and other conservation-related topics. We also work closely with the NEW Zoo where many students with an Animal Biology emphasis gain experience working in a zoo setting. Biology faculty work closely with biologists from the U.S. Fish and Wildlife Service, U.S. Forest Service, Wisconsin Department of Natural Resources, non-profit organizations (e.g., The Nature Conservancy, Baird Creek Foundation, Ridges Sanctuary), community organizations (e.g., Green Bay Botanical Gardens, Animal House), health facilities (e.g., Aurora Hospital), and private companies (e.g., Stantech Ecological Consulting, Schreiber Foods). Staff of the Cofrin Center for Biodiversity oversee many internships and employment opportunities in natural areas management, herbarium/museum curation, and field research, typically engaging more than 20 students every year. These activities are very popular and provide excellent real-life training that adds meaningfully to student career portfolios.

According to surveys of recent graduates (n=57), approximately 68% of Biology majors complete an internship during their time at UW-Green Bay. Approximately 30% complete an independent study under the guidance of a faculty member, and 30% participate in a travel course or other international academic experience. Biology students compete with other students in the natural sciences for a relatively large number (>15) endowed scholarships awarded every year. The Cofrin Center for Biodiversity administers a small research grants program that awards 5-10 student research grants of approximately $1,000 every year. Since 1989, nearly 150 students have received research funding from this program. In May, a highly successful heirloom vegetable sale generating approximately $3,000-4,000 annually, provides funding for student travel to conferences and for other forms of research support.

Biology faculty include some of UW-Green Bay's most published scholars. Since the last program assessment, researchers in the Biology discipline have published at least 55 peer-reviewed publications (see supplementary list), with hundreds of collaborators representing all continents except Antarctica. The list of publications includes papers in some of the world's most prestigious journals (Conservation Biology, Ecology, Canadian Journal of Fisheries and Aquatic Sciences, Frontiers in Genetics). Extramurally funded grants led by Biology faculty have generated nearly $2 million since 2008, providing UW-Green Bay students with numerous opportunities for faculty-guided research, equipment and data for use in laboratories and field courses, and indirect funds (overhead) that benefit UW-Green Bay as a whole. During the past three years, 3 biologists (Dornbush, Draney, and Wolf) have received the Founders Association Award for Excellence in Scholarship. Howe received the Herbert Fisk Johnson Professorship in Natural Sciences in 2012, and he was Barbara Hauxhurst Cofrin Professor of Environmental Science from 2007-2011.

Biology faculty regularly present papers at scientific meetings and symposia (the number of papers authored or co-authored exceeds 100 for this seven year reporting period), they are active reviewers in the scientific peer-review process, and all or nearly all faculty members contribute to outreach activities in the Green Bay community, ranging from presentations at the Phuture Phoenix program to participation on policy-making boards or working groups. Members of the Biology faculty also have contributed significant leadership on UW-Green Bay committees and councils, including the University Committee, Committee of Six, Personnel Council, General Education Council, and many others.

Students in or associated with UW-Green Bay's Biology program also have been recognized with awards and scholarly presentations. Every year since 2009, a student in the Biology Program at UW-Green Bay has been selected to participate in the UW System's "Posters in the Rotunda" event at the State Capital in Madison (Kari Petrashek, Aaron Groves, Eric Struck, David Lawrence, Holly James, Linda Vang, and Lindsay Hansen), and numerous other Biology students have presented papers at the annual Academic Excellence Symposium at UW-Green Bay. Recipients of the Cofrin Student Research Awards present their findings at an annual symposium organized by the Cofrin Center for Biodiversity. Howe and Wolf were contributors as co-authors of a paper that was awarded the Alwyn Gentry Best Student Presentation Award (presented by María Natalia Umaña under the supervision of Dr. Nathan Swenson of Michigan State University) at the Association for Tropical Biology and Conservation's 2013 Annual Meeting in San Jose, Costa Rica. Students have also presented at local, regional and national scientific meetings.

Section D. Program Enrollment Trends and Analysis

Provide an analysis of the data (both survey and institutional enrollment data) provided by the Office of Institutional Research and Assessment. Pay close attention to the demographic information. What trends are present? Are there any imbalances in terms of gender, race, or ethnicity? Describe what specific actions, if any, were taken or are intended to be taken based on the conclusions drawn from the analysis.

Over the 7 year period (2008-2014) a mean of 121 ± 4 se (range = 118-139) students were registered as Biology majors. The number of Biology majors remained relatively stable during this period, and has not shown the declining trend illustrated by the overall campus enrollment (Figure 2). However, the number of Biology majors has declined since the last review period (2001-2005 mean = 171 ± 4 se). Very few students declared a Biology minor during this period (ranging from 2-8), which was similar to the previous review period.

The gender ratio or Biology Majors (~65% female) follows the campus wide trend closely. We have very few minority students (~10%), which again is similar to campus wide percentage.

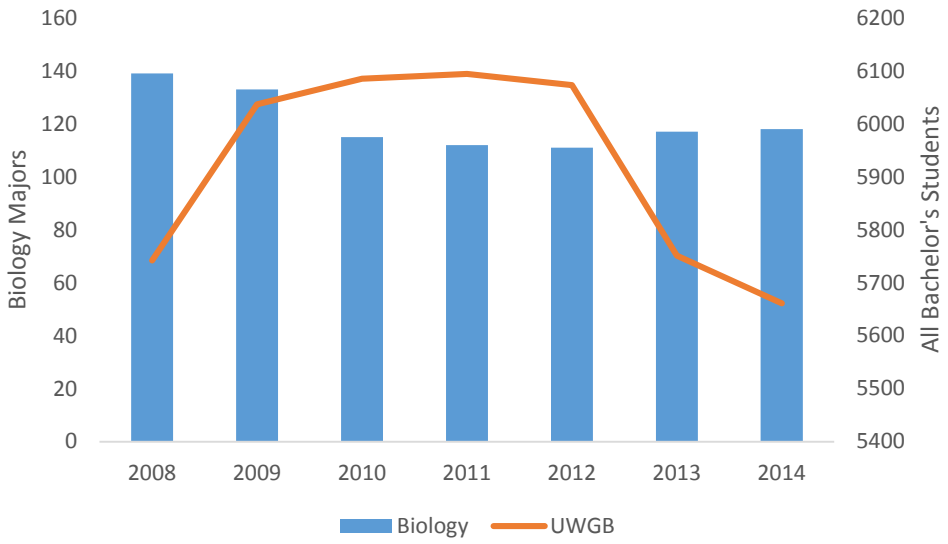


Figure 2. Biology majors and total Bachelor's students at University of Wisconsin-Green Bay from 2008-2014. Summary data provided by the office of Institutional Research and Assessment.

Graduating Senior Survey summary:

During the 5 year period (2010-2014), 130 Biology majors graduated, with a range of 10-35 graduating each year (mean = 26 ± 3). Only 57 (44%) of these graduating seniors completed the senior survey. Overall, students rated quality of internship, practicum, or field experience, quality of teaching and knowledge and expertise of biology faculty very highly. However, results revealed some dissatisfaction with the frequency of course offerings, variety of courses, and times courses were offered. During this period several biology faculty were on sabbatical and several left the institution, so some courses were not offered due to lack of instructors during this period. We have recently filled some of these positions and hope to have everyone on board by fall 2016, helping to alleviate many of these issues. We have also started to offer some on-line or hybrid courses to deal with time overlap issues. Advising was scored high by the majority of seniors, but several students gave these categories relatively low scores. Note that starting in 2014, the Biology Chair e-mailed students prior to course registration to remind them to schedule advising meetings. This simple pro-active measure appears to have greatly improved the number of students seeking advising, so we plan to continue this practice. Currently the Biology Chair does the bulk of advising for all areas of emphasis within the major. We will consider assigning faculty with expertise in each area of emphasis to advise students in those areas.

A notable result of the Graduating Senior Survey is that 60% of Biology majors plan to continue their education. Many of these students are likely place-bound or are inclined to stay in the Green Bay area, suggesting that significant opportunities exist for expanding the UW-Green Bay graduate program in this academic area.

Alumni Survey Summary:

The Alumni survey data cover the period from 2010-2014. Only 11% (N=17) of the alumni from this period participated in the survey. Overall responses were very positive. Most students ranked their critical analysis skills, problem-solving skills and understanding of biology/physical science and understanding the impact of science and technology in the highest categories (excellent or good). Written communication skills also scored high ratings (72% excellent or good). Only 50% of respondents felt that UWGB prepared them well in the area of public speaking and presentation skills. At least one core biology course (Ecology) and several of the upper level elective courses require student presentations, so

this result is somewhat surprising. However, these skills obviously are important for many career tracks, so greater emphasis on public speaking and presentations is warranted. Biology faculty will conduct a survey to find out which classes currently require oral presentation and we will subsequently discuss the possibility of adding additional opportunities for students to develop these important skills.

All Biology majors (100%) indicated that their educational experiences at UW-Green Bay helped them realize that learning is a lifelong process.

Survey results indicate that Biology majors rate highly the quality of teaching, knowledge and expertise of the faculty, faculty-student relationships, availability of faculty and overall grade for the major (94% in A or B category). Advising by faculty was rated high by most students (88%). We plan to continue seeking ways to maintain and improve teaching excellence.

Faculty Summary:

The Faculty Tables provided by the Office of Institutional Research and Assessment appear to be inaccurate. Biology currently has 13 active full-time faculty members, in addition to several faculty assigned to primarily administrative roles. Among the 13 full time Biology faculty, 6 are from NAS (Matt Dornbush has recently accepted an administrative role, so we currently have 5) and 7 are from HUB (although 2 searches are on-going and Craig Hanke is now at the Medical College of WI and is only teaching part time at UWGB). Among the full time faculty members, 3 are currently full professors, 7 are associate professors and 3 are assistant professors. Only 2 of the current active Biology faculty (Wolf and Grubisha) are female (~15%) and we currently have no minority faculty members in the Biology faculty. Qualified minority candidates have been invited as finalists for biology faculty positions, but we were not able to submit an offer because of a federal regulation requiring that the salary range for a foreign academic hire must meet certain minima, which exceed the salary of many long-serving faculty at UW-Green Bay. We would love to increase our salaries to the prevailing wages for foreign nationals! No action has been taken recently regarding the lack of faculty diversity, but the results of current searches are likely to increase the number of female biologists.

Section E. Program's Vision for Future Development

Describe your program's plan for future development including the program's major goals for the next seven-year period. These goals should established with the understanding that they will be used to guide program planning and development and serve as a framework for your program's next Self-Study Report.

By just about any measure (enrollment, faculty productivity, facilities, student opportunities), the Biology Program has been highly successful, not only during this reporting period but during the entire history of UW-Green Bay. Our vision for the future includes the desire to maintain and perhaps even fortify this strong academic tradition. With the hire of another new biologist during 2016, we will have an excellent mix of new and established faculty. Anticipated hiring will be needed to replace at least one other recently vacated position. The number of Biology faculty is rather small considering the number of students in the program, so replacing departures with strong teachers and scholars will be critically important for maintaining the tradition of this program. Fortunately, faculty positions in our program appear to be in demand, as illustrated by more than 70 applications for our most recent opening.

The Biology Program at UW-Green Bay is much more than a classroom-based curriculum and dedicated instructors. Faculty and students in the program are engaged in active research, internships, land stewardship, outreach, and meaningful contributions to the ecology and economy of northeastern

Wisconsin. Scholarship by UW-Green Bay biologists is not just regional in scope; many contributions have included international collaborators and many of the research publications authored by UW-Green Bay biologists are globally relevant. In order to maintain these successes, UW-Green Bay needs to recognize that an academic infrastructure has been instrumental in supporting the research and other contributions of which we are so proud. Examples of this infrastructure include modern laboratory facilities and support staff; the Cofrin Center for Biodiversity and staff (including curators of the Richter Museum and Fewless Herbarium), which provide hands-on student learning opportunities, part-time student employment, and resources to maintain natural areas for field trips and independent research projects; the Environmental Science and Policy Graduate Program, which attracts graduate students who serve as teaching assistants in introductory laboratories and who work with faculty on extramurally funded research; the Lab Science Greenhouse, which provides space for experiments and plant material for laboratory exercises; an effective computer network and technical support system; and other innovative elements of the Biology Program such as the Heirloom Plant Sale, international travel courses, and a rewarding student grants/scholarship program. These non-curricular features of the Biology Program and affiliated academic units are expensive, but the dividends create a quality program that is highly attractive to students, who themselves are rewarded with strong credentials for future career success.

Specific goals for the next seven year period address current issues and anticipated challenges:

- Ad-hoc instructors have been needed to teach Biology 204 labs, which, unlike Biology 202 labs, have not regularly been assigned graduate TA positions. We would like to add graduate TA opportunities for these labs to improve the availability of faculty to teach other (under-served) courses and to increase financial support for the Environmental Science and Policy Graduate Program.
- The Biology Seminar (Biology 490) currently is not listed as a General Education Capstone course, even though it could be eligible, even as a 1 credit course. We will seek to modify the content and course description to conform to the capstone course requirements. Subsequently, we will prepare and submit a proposal to the General Education Council to have this course added as a General Education option for Biology majors.
- We will continue to improve the assessment of Biology learning outcomes, perhaps trying multiple approaches in different classes. Results will be evaluated by the faculty and, if appropriate, we will modify the curriculum and perhaps course offerings to address concerns raised by the assessment.
- Educational technology and web-based resources are revolutionizing higher education. We need to respond to this rapidly changing learning environment by exploring more options for on-line instruction (including training faculty in best-practices for online teaching) and implementing innovative tools for improving classroom learning.
- Despite the impacts of new technologies and web-based learning, the importance of hands-on learning has not diminished. In fact, a strong argument can be made that field and laboratory experiences, supervised internships, and collaborative faculty-student research opportunities have become increasingly important. During the next seven year period, we hope to maintain and improve our strengths in these experience-based elements of higher education. Our goal is to become a leader in combining web-based learning tools with individualized, faculty-guided learning opportunities; our strong academic infrastructure and committed faculty have created a strong foundation for us to pursue this goal.

Section F. Summary and Concluding Statement

Respond specifically to the results and recommendations from the last review and end your report with a general concluding statement.

We have addressed all of the recommendations by the Academic Affairs Council (AAC) during its 2009 review of the Biology Program. A new, clearer mission statement has been developed, and assessment plan has been developed and implemented, and marketing materials including a revised Biology Program web site, posters, and brochures have been produced and disseminated. As discussed in this report, we seek further improvement in all of these areas. In particular, we recognize the need to better market the program to help meet the institutional challenge of increasing enrollment at UW-Green Bay. In this case the Biology Program has much to offer prospective students; whereas previous accomplishments have helped build a strong, academically rigorous program replete with student hands-on learning opportunities, we can do a much better job promoting these opportunities and attracting students who can benefit from the resources that we have here at UW-Green Bay.

Finally, the AAC recommended in 2009 that the Biology and Human Biology programs should work together to develop either two distinctly different majors or failing this, combine these two programs under one degree program. Along these same lines, they noted that Areas of Emphasis within the Biology program are not very different, and we were advised to consider either making them more distinct or merging some of them. The first issue (overlap in Biology and Human Biology programs) was addressed by Dean Furlong (see letter below), who argued that the two programs serve different groups of students and usually (although not necessarily always) provide a foundation for different career tracks. We further argue that similarity of curricula, including overlap in the Biology areas of emphasis, is not necessarily a bad thing. Students often change career paths, and the existing congruence of programs and areas of emphasis makes transitions easier for them. Areas of emphasis are merely guides for constructing an appropriate college background for post-graduate careers. Not only do students change their directions, but the careers themselves are changing rapidly due to new technologies and social needs (e.g., molecular genetics has become an important tool for wildlife biologists; ecology of microbiomes has become a rapidly advancing element of microbiology). Hence, we embrace the similarity and modest interchangeability of curricular tracks, perhaps even extending this concept to the relationship between the Human Biology and Biology academic programs.

Section G. Required Attachments

A series of tables, prepared by the Office of Institutional Research and Assessment.

A. Graduating Senior Survey Tables including employment data
B. Alumni Survey Data Tables including employment data
C. Student Tables
D. Teaching Tables
E. Faculty Tables*

A. Graduating Senior Survey Tables including employment data.

Graduating Senior Survey: 2010, 2011, 2012, 2013 & 2014

	Graduation Year	Biology	UWGB Overall
Graduates:	2010	29	1106
	2011	35	1185
	2012	19	1293
	2013	28	1229
	2014	19	1233
Response Rate*	2010-2014	57/130 (44%)	2841/6046 (47%)

* Note: % response misses double-majors who choose to report on their other major.

Table 1: Rating the MAJOR (A = 4, B = 3.0, etc.)	**Unit of Analysis**	**2010-2014**						
		N	**mean**	**A**	**B**	**C**	**D**	**F**
Clarity of major requirements	BIOL	57	3.3	40%	47%	11%	2%	0
	UWGB	2836	3.5	58%	34%	6%	1%	1%
Reasonableness of major requirements	BIOL	57	3.3	40%	49%	7%	4%	0
	UWGB	2831	3.5	56%	36%	6%	1%	<1%
Variety of courses available in your major	BIOL	57	2.4	15%	37%	30%	9%	9%
	UWGB	2821	3.0	35%	42%	17%	5%	1%
Frequency of course offerings in your major	BIOL	57	2.0	7%	25%	40%	19%	9%
	UWGB	2819	2.7	22%	41%	26%	8%	3%
Times courses were offered	BIOL	56	2.4	14%	36%	25%	21%	4%
	UWGB	2769	2.9	28%	41%	22%	6%	2%
Quality of internship, practicum, or field experience	BIOL	39	3.2	51%	28%	15%	3%	3%
	UWGB	1609	3.3	57%	28%	10%	3%	2%
Quality of teaching by faculty in your major	BIOL	57	3.4	54%	33%	11%	2%	0
	UWGB	2817	3.4	52%	38%	8%	1%	<1%
Knowledge and expertise of the faculty in your major	BIOL	57	3.7	68%	32%	0	0	0
	UWGB	2834	3.6	69%	27%	3%	<1%	<1%
Faculty encouragement of your	BIOL	56	3.2	43%	41%	11%	3%	2%

Table 1: Rating the MAJOR (A = 4, B = 3.0, etc.)	**Unit of Analysis**	**2010-2014**						
		N	**mean**	**A**	**B**	**C**	**D**	**F**
educational goals	UWGB	2800	3.4	56%	30%	11%	2%	1%
Overall quality of advising received from the faculty in your major	BIOL	52	2.9	44%	29%	8%	8%	11%
	UWGB	2706	3.2	53%	25%	12%	5%	4%
Availability of your major advisor for advising	BIOL	52	3.0	50%	19%	17%	8%	6%
	UWGB	2693	3.3	60%	24%	9%	4%	3%
Ability of your advisor to answer university questions	BIOL	51	2.9	41%	27%	20%	2%	10%
	UWGB	2649	3.4	63%	22%	9%	4%	3%
Ability of your advisor to answer career questions	BIOL	44	2.8	43%	27%	7%	9%	14%
	UWGB	2376	3.2	52%	28%	13%	4%	3%
In-class faculty-student interaction	BIOL	57	2.9	33%	35%	23%	9%	0
	UWGB	2657	3.1	44%	30%	13%	12%	<1%
Overall grade for your major (**not** an average of the above)	BIOL	57	3.1	23%	65%	10%	2%	0
	UWGB	2801	3.4	49%	42%	8%	1%	<1%

Table 2. Job related to major while completing degree?	**Unit of Analysis**	**n**	**Full-time**		**Part-time**		**No**
			Paid	**Non-paid**	**Paid**	**Non-paid**	
2010-2014 percent	BIOL	57	9%	0	23%	9%	59%
	UWGB	2827	15%	<1%	33%	6%	46%

Table 3. "If you could start college over"	**Unit of Analysis**	**n**	**UW-Green Bay**		**Another college**		**No BA degree**
			Same major	**Different major**	**Same major**	**Different major**	
2010-2014 percent	BIOL	57	58%	11%	21%	5%	5%
	UWGB	2824	68%	13%	13%	5%	1%

Table 4. Plans regarding graduate/professional study	**Unit of Analysis**	**n**	**Already admitted**	**Have applied**	**Plan to eventually attend**	**NA/have not applied yet**
2010-2014 percent	BIOL	43	12%	11%	63%	14%
	UWGB	2161	8%	12%	63%	17%

Table 5. Highest degree planned	**Unit of Analysis**	**n**	**Bachelor's**	**Master's**	**Specialist's**	**Professional**	**Doctoral**
2010-2014 percent	BIOL	57	33%	33%	2%	14%	18%
	UWGB	2827	32%	49%	2%	5%	12%

Table 6. General Education preparation **Current proficiency vs. Contribution of Gen Ed to current proficiency** (3-pt. scale; 3 = high, 2 = medium, 1 = low)	**Unit of Analysis**	**Current Proficiency**			**Gen Ed Contribution**		
		n	**% High**	**mean**	**n**	**% High**	**mean**
Critical analysis skills.	BIOL	51	55%	2.5	54	32%	1.9
	UWGB	2661	64%	2.6	2591	33%	2.2
Problem-solving skills.	BIOL	51	51%	2.5	52	21%	2.0
	UWGB	2658	70%	2.7	2583	34%	2.2
Understanding biology and the physical sciences.	BIOL	51	82%	2.8	52	52%	2.3
	UWGB	2580	27%	2.0	2460	26%	2.0
Understanding the impact of science and technology.	BIOL	51	73%	2.7	51	39%	2.2
	UWGB	2591	36%	2.2	2483	27%	2.0
Understanding social, political, geographic, and economic structures.	BIOL	51	22%	2.0	53	26%	2.0
	UWGB	2606	35%	2.2	2532	30%	2.1
Understanding the impact of social institutions and values.	BIOL	51	26%	2.1	53	23%	1.9
	UWGB	2622	50%	2.4	2541	38%	2.2
Understanding the significance of major events in Western civilization.	BIOL	51	20%	1.9	54	20%	1.9
	UWGB	2593	33%	2.2	2505	32%	2.1
Understanding the role of the humanities in identifying and clarifying values.	BIOL	51	22%	2.0	52	25%	2.0
	UWGB	2616	39%	2.3	2537	35%	2.2
Understanding at least one Fine Art.	BIOL	51	28%	2.1	54	41%	2.2
	UWGB	2597	39%	2.2	2498	34%	2.1
Understanding contemporary global issues.	BIOL	51	29%	2.1	53	19%	1.8
	UWGB	2605	34%	2.2	2505	27%	2.0
Understanding the causes and effects of stereotyping and racism.	BIOL	51	43%	2.3	50	34%	2.0
	UWGB	2625	61%	2.6	2539	41%	2.2
Written communication skills	BIOL	51	53%	2.5	54	32%	2.1
	UWGB	2637	67%	2.6	2573	44%	2.3
Public speaking and presentation skills	BIOL	50	28%	2.1	52	15%	1.8
	UWGB	2612	45%	2.3	2498	30%	2.1
Computer skills	BIOL	51	47%	2.4	53	19%	1.8
	UWGB	2620	55%	2.5	2483	29%	2.0

Table 7. Educational experiences
(5 pt. scale; 5 = strongly agree)

	Unit of Analysis	2010-2014		
		n	Strongly Agree or Agree	mean
Because of my educational experiences at UW-Green Bay, I have learned to view learning as a lifelong process.	BIOL	53	91%	4.4
	UWGB	2749	90%	4.4
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	BIOL	55	40%	3.1
	UWGB	2643	46%	3.3
The UW-Green Bay educational experience encourages students to become involved in community affairs.	BIOL	54	50%	3.4
	UWGB	2634	58%	3.6
My experiences at UW-Green Bay encouraged me to think creatively and innovatively.	BIOL	54	74%	3.9
	UWGB	2746	82%	4.1
My education at UW-Green Bay has given me a “competitive edge” over graduates from other institutions.	BIOL	55	44%	3.2
	UWGB	2629	64%	3.8
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	BIOL	54	56%	3.6
	UWGB	2710	75%	4.0
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	BIOL	54	54%	3.3
	UWGB	2730	72%	3.9
I would recommend UW-Green Bay to a friend, co-worker, or family member.	BIOL	55	76%	4.0
	UWGB	2742	83%	4.2
There is a strong commitment to racial harmony on this campus.	BIOL	51	47%	3.6
	UWGB	2444	59%	3.7
The faculty and staff of UWGB are committed to gender equity.	BIOL	52	77%	4.1
	UWGB	2545	77%	4.1
This institution shows concern for students as individuals.	BIOL	55	78%	4.0
	UWGB	2689	75%	4.0
The General Education requirements at UWGB were a valuable component of my education.	BIOL	54	43%	3.1
	UWGB	2606	50%	3.3

Table 8. Activities while at UW-Green Bay	Unit of Analysis	n	Independent study	Student org	Internship	Professional organization	Community service	Worked with a faculty member	Study group	Study abroad
2010-2014 percent	BIOL	57	30%	52%	68%	7%	54%	28%	74%	30%
	UWGB	2834	25%	48%	55%	22%	58%	23%	56%	14%

Table 9. Rating services and resources (A = 4, B = 3, etc.)	Unit of Analysis	2010-2014		
		n	A or B	mean
Library services (hours, staff, facilities)	BIOL	51	86%	3.4
	UWGB	2373	91%	3.4
Library collection (books, online databases)	BIOL	47	92%	3.4
	UWGB	2295	91%	3.4
Admission Office	BIOL	45	93%	3.4
	UWGB	2220	92%	3.4
Financial Aid Office	BIOL	40	88%	3.2
	UWGB	2104	88%	3.3
Bursar's Office	BIOL	55	89%	3.4
	UWGB	2602	87%	3.3
Career Services	BIOL	33	79%	3.1
	UWGB	1561	85%	3.3
Academic Advising Office	BIOL	46	74%	2.9
	UWGB	2237	76%	3.1
Student Health Services	BIOL	32	97%	3.7
	UWGB	1372	87%	3.4
Registrar's Office	BIOL	45	98%	3.5
	UWGB	2272	92%	3.5
Writing Center	BIOL	12	92%	3.7
	UWGB	951	85%	3.3
University Union	BIOL	51	82%	3.2
	UWGB	2266	89%	3.4
Student Life	BIOL	26	65%	3.0
	UWGB	1351	83%	3.2
Counseling Center	BIOL	15	93%	3.7
	UWGB	534	80%	3.2
Computer Facilities (labs, hardware, software)	BIOL	56	98%	3.8
	UWGB	2361	95%	3.6

Table 9. Rating services and resources
(A = 4, B = 3, etc.)

	Unit of Analysis	2010-2014		
		n	A or B	mean
Computer Services (hours, staff, training)	BIOL	49	96%	3.8
	UWGB	2135	92%	3.5
Kress Events Center	BIOL	38	100%	3.7
	UWGB	1896	96%	3.7
Dining Services	BIOL	48	48%	2.2
	UWGB	1733	57%	2.6
American Intercultural Center	BIOL	7	100%	3.6
	UWGB	365	87%	3.3
International Office	BIOL	13	92%	3.5
	UWGB	374	82%	3.1
Residence Life	BIOL	23	57%	2.6
	UWGB	1136	75%	2.9
Bookstore	BIOL	57	79%	3.0
	UWGB	2703	79%	3.1

B. Alumni Survey Data Tables including employment data

Alumni Survey: 2010, 2011, 2012, 2013 & 2014

	Survey year	Graduation Year	Biology	UWGB Overall
Graduates:	2010	2006-2007	32	1148
	2011	2007-2008	26	1162
	2012	2008-2009	27	1133
	2013	2009-2010	37	1295
	2014	2010-2011	30	1309
Response Rate*	2010-2014		17/152 (11%)	874/6047 (14%)

* Note: % response misses double-majors who chose to report on their other major.

Table 1. Preparation & Importance
- **Preparation by UWGB (5-pt. scale; 5 = excellent)**
- **Importance to current job or graduate program (5-pt. scale; 5 = very important)**

	Unit of Analysis	2010-2014					
		Preparation			Importance		
		n	Excellent or Good	Mean	n	Very important or Important	Mean
Critical analysis skills.	BIOL	13	69%	3.4	14	93%	4.5
	UWGB	682	59%	3.6	664	76%	4.2
Problem-solving skills.	BIOL	14	64%	3.4	14	79%	4.5
	UWGB	682	61%	3.7	659	78%	4.3
Understanding biology and the physical sciences.	BIOL	14	72%	3.8	13	62%	3.9
	UWGB	652	45%	3.4	629	31%	2.7
Understanding the impact of science and technology.	BIOL	14	71%	3.8	12	75%	4.1
	UWGB	656	47%	3.4	646	43%	3.2
Understanding social, political, geographic, and economic structures.	BIOL	14	71%	3.7	13	31%	3.1
	UWGB	667	56%	3.6	654	53%	3.5
Understanding the impact of social institutions and values.	BIOL	14	71%	3.7	13	31%	2.8
	UWGB	670	60%	3.7	650	56%	3.6
Understanding the significance of major events in Western civilization.	BIOL	14	36%	3.4	13	23%	2.4
	UWGB	659	51%	3.5	626	31%	2.8
Understanding a range of literature.	BIOL	14	29%	3.1	13	23%	2.5
	UWGB	657	48%	3.4	632	33%	2.8
Understanding the role of the humanities in identifying and clarifying individual and social values.	BIOL	14	57%	3.6	13	23%	2.7
	UWGB	661	52%	3.5	634	41%	3.1
Understanding at least one Fine Art, including its nature and function(s).	BIOL	13	46%	3.4	13	8%	1.9
	UWGB	662	55%	3.5	622	29%	2.7

Table 1. Preparation & Importance
- **Preparation by UWGB (5-pt. scale; 5 = excellent)**
- **Importance to current job or graduate program (5-pt. scale; 5 = very important)**

		2010-2014					
		Preparation			Importance		
	Unit of Analysis	n	Excellent or Good	Mean	n	Very important or Important	Mean
Understanding contemporary global issues.	BIOL	14	50%	3.4	13	31%	2.9
	UWGB	663	51%	3.5	640	50%	3.4
Understanding the causes and effects of stereotyping and racism.	BIOL	14	57%	3.5	13	31%	2.8
	UWGB	663	57%	3.6	642	51%	3.4
Written communication skills.	BIOL	14	72%	3.9	14	93%	4.6
	UWGB	675	69%	3.9	653	78%	4.2
Public speaking and presentation skills.	BIOL	14	50%	3.1	14	72%	4.1
	UWGB	671	55%	3.6	656	72%	4.1
Reading skills.	BIOL	14	43%	3.2	14	86%	4.5
	UWGB	673	63%	3.8	654	76%	4.2
Listening skills.	BIOL	13	54%	3.5	14	100%	4.8
	UWGB	669	64%	3.8	656	79%	4.3
Leadership and management skills.	BIOL	14	43%	3.0	14	79%	4.4
	UWGB	673	59%	3.6	652	78%	4.2

Table 2. Educational experiences
(5-pt. scale; 5 = strongly agree)

	Unit of Analysis	N	Strongly Agree or Agree	Mean
My educational experiences at UW-Green Bay helped me to learn or reinforced my belief that learning is a lifelong process.	BIOL	16	100%	4.3
	UWGB	869	91%	4.3
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	BIOL	16	56%	3.4
	UWGB	857	52%	3.4
Students at UW-Green Bay are encouraged to become involved in community affairs.	BIOL	16	50%	3.4
	UWGB	853	59%	3.6
My experiences and course work at UW-Green Bay encouraged me to think creatively and innovatively.	BIOL	17	71%	3.8
	UWGB	867	87%	4.2
The interdisciplinary, problem-focused education provided by UW-Green Bay gives its graduates an advantage when they are seeking employment or applying to graduate school.	BIOL	17	65%	3.6
	UWGB	859	77%	4.0
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	BIOL	17	71%	3.9
	UWGB	868	83%	4.1

Table 2. Educational experiences (5-pt. scale; 5 = strongly agree)	**Unit of Analysis**	**N**	**Strongly Agree or Agree**	**Mean**
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	BIOL	17	65%	3.5
	UWGB	861	73%	3.9
I would recommend UW-Green Bay to co-worker, friend, or family member.	BIOL	17	88%	4.2
	UWGB	870	90%	4.4
The General Education requirements at UWGB were a valuable component of my education.	BIOL	17	59%	3.6
	UWGB	833	57%	3.5
UWGB cares about its graduates.	BIOL	16	81%	4.0
	UWGB	837	62%	3.7
I feel connected to UWGB.	BIOL	17	59%	3.6
	UWGB	856	45%	3.3

Table 3. "If you could start college over"	**Unit of Analysis**	**n**	**UW-Green Bay**		**Another college**		**No bachelor's degree anywhere**
			Same major	**Different major**	**Same major**	**Different major**	
2010–2014 percent	BIOL	17	59%	23%	12%	6%	0
	UWGB	869	65%	22%	7%	5%	1%

Table 4. Rating the MAJOR (Scale: A = 4, B = 3, etc.)	**Unit of Analysis**	**2010–2014**			
		n	**A or B**	**C or D**	**mean**
Quality of teaching.	BIOL	17	94%	6%	3.8
	UWGB	872	95%	5%	3.6
Knowledge and expertise of the faculty.	BIOL	17	94%	6%	3.8
	UWGB	870	98%	2%	3.7
Faculty-student relationships (e.g., helpfulness, sensitivity, acceptance of different views).	BIOL	17	94%	6%	3.7
	UWGB	869	91%	8%	3.6
Importance and relevance of courses to professional and academic goals.	BIOL	17	77%	23%	3.2
	UWGB	863	89%	10%	3.4
Advising by faculty (e.g., accuracy of information).	BIOL	17	88%	12%	3.4
	UWGB	851	87%	12%	3.4
Availability of faculty (e.g., during office hours).	BIOL	17	94%	6%	3.8

	UWGB	849	93%	7%	3.5
Overall grade for the major (not a sum of the above).	BIOL	17	94%	6%	3.7
	UWGB	863	94%	5%	3.5

Table 5. Highest degree planned	**Unit of Analysis**	**n**	**Bachelor's**	**Master's**	**Specialist**	**Professional**	**Doctoral**
2010-2014 percent	BIOL	17	35%	41%	0	6%	18%
	UWGB	869	38%	45%	1%	5%	11%

Table 6. Graduate/professional study plans	**Unit of Analysis**	**n**	**Already graduated**	**Currently enrolled**	**Accepted, not enrolled**	**Rejected**	**Have not applied**
2010-2014 percent	BIOL	12	8%	33%	0	8%	50%
	UWGB	562	23%	22%	4%	3%	48%

Table 7. Current employment status	**BIOL (n = 17)**	**UWGB (n = 870)**
Employed full-time (33 or more hours/week)	88%	78%
Employed part-time	6%	11%
Unemployed, seeking work	0	5%
Unemployed, not seeking work	0	2%
Student, not seeking work	6%	4%

Table 8. Satisfaction with current job (5-pt. scale; 5 = very satisfied)	**Unit of Analysis**	**n**	**Very satisfied or satisfied**	**mean**
2010-2014 percentage	BIOL	16	69%	3.9
	UWGB	771	73%	3.9

Table 9. Minimum educational requirements for current job	**BIOL (n = 17)**	**UWGB (n = 762)**
High school or less	35%	19%
Certificate	6%	2%
Associate's degree	0	13%

Bachelor's degree	59%	57%
Graduate degree	0	8%

Table 10. Extent to which job relates to major	**BIOL (n = 17)**	**UWGB (n = 770)**
Very related	29%	49%
Somewhat related	41%	31%
Not at all related	29%	19%

Table 11. Current income	**BIOL (n = 17)**	**UWGB (n = 745)**
Under $20,000	12%	12%
$20,000 to $25,999	12%	11%
$26,000 to $29,999	23%	9%
$30,000 to $35,999	41%	20%
$36,000 to $39,999	0	13%
$40,000 to $49,999	0	15%
$50,000 or more	12%	20%

Employers, Locations, and Job Titles

Poochies & Mutts	Green Bay	Wisconsin	Pet Care Professional and Groomer
Evergreen Market	Crivitz	Wisconsin	Owner
Self Employed, Precision Performance and Wellness, LLC	Appleton, New London, Green Bay	Wisconsin	Trainer and Dietetic Weight Management and Sports Nutrition
Foxy Lady Cruises	Green Bay	Wisconsin	Cruise Consultant/Office Manager
Enzymetic Therapy	Green Bay	Wisconsin	Microbiologist
Private Family	Chicago	Illinois	Nanny
XLC Services at P&G site	Green Bay	Wisconsin	Wet Lab Tech 2
Boston College Biology Department	Chestnut Hill	Masachuset	PhD Graduate Student
Aurora Healthcare	Milwaukee	Wisconsin	Research Compliance & Regulatory Affairs
Biolife	Green Bay	Wisconsin	Medical Historian
		Wisconsin	

Sanimax USA	Green Bay	Wisconsin	Lab Tech
Institute for Environmental Health	Green Bay	Wisconsin	Microbiologist
Northeast Wisconsin Technical College	Green Bay	Wisconsin	EMS Instructor/ Coordinator
PNC Bank	Waukesha	Wisconsin	Teller Supervisor
PPD, Inc	Middleton	Wisconsin	Associate quality assurance auditor

C. Student Tables

1. Declared Majors and Minors for Past Seven Falls

	Fall Headcounts						
	2008	2009	2010	2011	2012	2013	2014
Declared Majors, end of term	139	133	115	112	111	117	118
Declared Minors, end of term	3	4	2	3	7	9	8

2. Profile of Declared Majors (most recent fall). Profile includes gender, ethnicity, age, geographic origins, year in school and full-time, part-time attendance status.

	Fall Declared Majors - Characteristics													
	2008		2009		2010		2011		2012		2013		2014	
Female	90	65 %	87	65 %	74	64 %	73	65 %	73	66 %	74	63 %	77	65 %
Minority	14	10 %	13	10 %	11	10 %	13	12 %	13	12 %	11	9%	10	8%
Age 26 or older	19	14 %	16	12 %	16	14 %	10	9%	7	6%	4	3%	2	2%
Location of HS: Brown County	41	29 %	37	28 %	28	24 %	34	30 %	30	27 %	26	22 %	27	23 %
Location of HS:	132	95 %	129	97 %	106	92 %	102	91 %	104	94 %	108	92 %	111	94 %

	Fall Declared Majors - Characteristics													
	2008		2009		2010		2011		2012		2013		2014	
Wisconsin														
Attending Full Time	125	90%	119	89%	98	85%	95	85%	99	89%	101	86%	110	93%
Freshmen	30	22%	7	5%	5	4%	2	2%	7	6%	6	5%	2	2%
Sophomores	25	18%	27	20%	17	15%	20	18%	24	22%	24	21%	19	16%
Juniors	33	24%	35	26%	35	30%	38	34%	33	30%	42	36%	48	41%
Seniors	50	36%	64	48%	58	50%	52	46%	47	42%	45	38%	49	42%

3. Majors and Minors Graduated for Past Seven Years.

	Calendar Year Headcounts						
	2008	2009	2010	2011	2012	2013	2014
Graduated Majors (May, Aug. & Dec.)	26	29	34	40	22	32	23
Graduated Minors (May, Aug. & Dec.)	2	.	.	2	4	1	.

4. Profile of Graduated Majors (most recent year). Profile includes gender, ethnicity, age, honors, mean credits earned at UW-Green Bay, mean GPA at graduation.

	Characteristics of Graduated Majors													
	2008		2009		2010		2011		2012		2013		2014	
Graduates who are... Women	13	50%	23	79%	20	59%	28	70%	13	59%	22	69%	13	57%
... Students of Color	0	0%	5	17%	3	9%	2	5%	1	5%	2	6%	2	9%
... Over 26 Years Old	8	31%	10	34%	13	38%	10	25%	11	50%	7	22%	5	22%
Graduates earning Degree Honors	6	23%	11	38%	15	44%	10	25%	3	14%	14	44%	4	17%

5. Student Qualifications of Declared Majors (most recent fall). Qualifications include original status (freshman or transfer), prior college GPA, mean transfer credits, mean high school GPA, mean high school percentile rank, mean ACT composite, reading, English and mathematics scores

	Fall Declared Majors - Characteristics						
	2008	2009	2010	2011	2012	2013	2014
Average HS Cumulative G.P.A.	3.35	3.40	3.38	3.27	3.38	3.40	3.38
Average ACT Composite Score	23.5	23.8	23.4	23.2	23.5	23.5	23.8
Average ACT Reading Score	24.0	24.4	23.8	23.5	24.2	23.9	24.3

	Fall Declared Majors - Characteristics						
	2008	2009	2010	2011	2012	2013	2014
Average ACT English Score	23.1	23.3	22.7	23.1	23.1	22.8	23.0
Average ACT Math Score	23.3	23.4	23.3	22.7	22.9	23.3	23.5
Average ACT Science Score	23.7	24.0	23.6	23.6	23.8	23.7	24.3

D. Teaching Tables

1. Characteristics of Declared Majors.

	Fall Declared Majors - Characteristics						
	2008	2009	2010	2011	2012	2013	2014
Percent started as Freshmen	63%	56%	52%	50%	55%	55%	57%
Percent started as Transfers	37%	44%	48%	50%	45%	45%	43%
Percent with prior AA degree	10%	9%	14%	13%	13%	15%	14%
Percent with prior BA degree	9%	13%	14%	13%	7%	3%	1%

2. Student Credit Hours by Level and Course Type for Past Seven Years.

	Characteristics of Graduated Majors						
	2008	2009	2010	2011	2012	2013	2014
Average Credits Completed Anywhere	132	144	144	143	141	140	141
Average Credits Completed at UWGB	106	113	130	116	128	119	124
Average Cum GPA for Graduates	3.07	3.26	3.33	3.12	3.08	3.36	3.08

3. Headcounts by Level and Course Type for Past Seven Years.

			Headcount Enrollments, Credit-bearing Activities						
			2008	2009	2010	2011	2012	2013	2014
Lectures	1-Lower	1-Spring	252	263	282	250	230	199	195
		2-Summer	24	21	22	21	14	23	19

			Headcount Enrollments, Credit-bearing Activities						
			2008	2009	2010	2011	2012	2013	2014
		3-Fall	383	311	309	333	332	273	259
		All	659	595	613	604	576	495	473
	2-Upper	1-Spring	309	323	302	272	257	331	367
		2-Summer	47	33	48	43	58	40	41
		3-Fall	270	253	313	282	251	215	330
		All	626	609	663	597	566	586	738
	All		1285	1204	1276	1201	1142	1081	1211
IST/FEX	1-Lower	1-Spring	.	.	.	.	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	.	.	.	.	.	.
		All	.	.	.	.	.	.	.
	2-Upper	1-Spring	6	8	4	12	14	11	4
		2-Summer	1	2	1	4	2	3	6
		3-Fall	13	9	14	14	8	6	10
		All	20	19	19	30	24	20	20
	All		20	19	19	30	24	20	20
All			1305	1223	1295	1231	1166	1101	1231

4. Average Section Sizes by Level for Group Sections for Past Seven Years.

			Average Section Size of Lectures						
			2008	2009	2010	2011	2012	2013	2014
Lectures	1-Lower	1-Spring	126.0	131.5	141.0	125.0	76.7	99.5	97.5
		2-Summer	24.0	21.0	22.0	21.0	7.0	23.0	19.0
		3-Fall	127.7	103.7	103.0	111.0	83.0	91.0	86.3
		All	109.8	99.2	102.2	100.7	64.0	82.5	78.8
	2-Upper	1-Spring	30.9	32.3	33.6	30.2	25.7	22.1	30.6
		2-Summer	47.0	16.5	48.0	43.0	29.0	40.0	41.0
		3-Fall	38.6	36.1	39.1	35.3	31.4	23.9	30.0
		All	34.8	32.1	36.8	33.2	28.3	23.4	30.8
	All		53.5	48.2	53.2	50.0	39.4	34.9	40.4

5. Total Unduplicated Group Courses Offered in Past Four Years.

			Lectures and Lab/Discussion Sections (#)						
			2008	2009	2010	2011	2012	2013	2014
Lectures	1-Lower	1-Spring	2	2	2	2	3	2	2
		2-Summer	1	1	1	1	2	1	1
		3-Fall	3	3	3	3	4	3	3
		All	6	6	6	6	9	6	6
	2-Upper	1-Spring	10	10	9	9	10	15	12
		2-Summer	1	2	1	1	2	1	1
		3-Fall	7	7	8	8	8	9	11
		All	18	19	18	18	20	25	24
	All		24	25	24	24	29	31	30
Lab/Disc	1-Lower	1-Spring	11	11	13	11	11	9	9
		2-Summer	1	1	1	1	1	1	1
		3-Fall	12	12	12	12	14	12	11
		All	24	24	26	24	26	22	21
	2-Upper	1-Spring	6	6	5	6	6	6	7
		2-Summer	2	1	2	2	2	2	2
		3-Fall	8	9	8	7	6	7	9
		All	16	16	15	15	14	15	18
	All		40	40	41	39	40	37	39

	Lectures and Lab/Discussion Sections (#)						
	2008	2009	2010	2011	2012	2013	2014
All	64	65	65	63	69	68	69

6. Student Credit Hours in General Education Courses for Past Seven Years. As percent of all enrollments in group sections.

			Student Credit Hours, Credit-bearing Activities						
			2008	2009	2010	2011	2012	2013	2014
Lectures	1-Lower	1-Spring	1008	1052	1128	1000	919	796	780
		2-Summer	96	84	88	84	55	92	76
		3-Fall	1532	1244	1236	1332	1327	1092	1036
		All	2636	2380	2452	2416	2301	1980	1892
	2-Upper	1-Spring	972	955	944	860	837	921	1146
		2-Summer	188	124	192	172	220	160	164
		3-Fall	951	930	1052	924	759	713	1016
		All	2111	2009	2188	1956	1816	1794	2326
	All		4747	4389	4640	4372	4117	3774	4218
IST/FEX	1-Lower	1-Spring	.	.	.	.	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	.	.	.	.	.	.
		All	.	.	.	.	.	.	.
		1-Spring	20	13	8	30	24	24	8

			Student Credit Hours, Credit-bearing Activities						
			2008	2009	2010	2011	2012	2013	2014
	2-Upper	2-Summer	1	6	1	11	7	5	16
		3-Fall	26	22	28	29	13	23	25
		All	47	41	37	70	44	52	49
	All		47	41	37	70	44	52	49

7. Sections by Level and Course Type for Past Seven Years.

			Lectures and Lab/Discussion Sections (#)						
			2008	2009	2010	2011	2012	2013	2014
Lectures	1-Lower	1-Spring	2	2	2	2	3	2	2
		2-Summer	1	1	1	1	2	1	1
		3-Fall	3	3	3	3	4	3	3
		All	6	6	6	6	9	6	6
	2-Upper	1-Spring	10	10	9	9	10	15	12
		2-Summer	1	2	1	1	2	1	1
		3-Fall	7	7	8	8	8	9	11
		All	18	19	18	18	20	25	24
	All		24	25	24	24	29	31	30
Lab/Disc		1-Spring	11	11	13	11	11	9	9

			Lectures and Lab/Discussion Sections (#)						
			2008	2009	2010	2011	2012	2013	2014
	1-Lower	2-Summer	1	1	1	1	1	1	1
		3-Fall	12	12	12	12	14	12	11
		All	24	24	26	24	26	22	21
	2-Upper	1-Spring	6	6	5	6	6	6	7
		2-Summer	2	1	2	2	2	2	2
		3-Fall	8	9	8	7	6	7	9
		All	16	16	15	15	14	15	18
	All		40	40	41	39	40	37	39
All			64	65	65	63	69	68	69

	Unique Lecture Courses Delivered in Past Four Years					
	2008	2009	2010	2011	2012	2013
1-Lower	2	2	2	2	2	2
2-Upper	20	20	19	19	19	20

	General Education as a Percent of all Credits in Lectures						
	2008	2009	2010	2011	2012	2013	2014
1-Lower	73%	67%	71%	70%	73%	76%	89%
2-Upper	0%	0%	0%	0%	0%	0%	0%

E. Faculty Tables*

1. Full-Time Faculty by Rank. Headcount, FTE, student credit hours per FTE

	Instructional Staff Headcounts and FTEs						
	2008	2009	2010	2011	2012	2013	2014
Full Professors (FT)	5	3	3	3	5	7	8
Associate Professors (FT)	11	14	15	17	15	12	10
Assistant Professors (FT)	6	7	4	3	5	3	6
Instructors and Lecturers (FT)	8	6	8	6	4	5	4
Total Full-time Instructional Staff	30	30	30	29	29	27	28
Part-time Instructional Staff	15	18	18	16	.	.	.
FTE of Part-time Faculty	5.6	6.5	6.8	3.2	.	.	.
Total Instructional FTE	35.6	36.5	36.8	32.2	.	.	.

2. Student Credit Hours (SCH) per FTE.

	Student Credit Hours per Faculty FTE						
	2008	2009	2010	2011	2012	2013	2014
SCH per Full-time Faculty FTE	345	364	406	358	.	.	.
SCH per Part-time Faculty FTE	160	247	137	587	.	.	.
SCH per Faculty FTE	316	344	356	378	.	.	.

Attachments:

A) The program's current official description and requirements as published in the most recent Undergraduate Catalog;

B) The Academic Affairs Council and Dean's conclusions and recommendations from the program's last review.

Disciplinary Major or Minor
(Bachelor of Science)
Professors – Mathew E. Dornbush, Michael L. Draney, Robert W. Howe, Gary Miller, Amy T. Wolf (chair)
Associate Professors – Craig J. Hanke, James C. Marker, Daniel Meinhardt, Brian Merkel, Uwe Pott, Donna L. Ritch
Assistant Professors – Patrick Forsythe, Lisa Grubisha, Paul Mueller
Biology is one of UW-Green Bay's most popular and strongest academic programs. The curriculum explores living systems from subcellular organelles to ecosystems. Biology majors can customize their academic plans to emphasize cell and molecular biology, animal biology, or ecology and conservation science. These tracks prepare students for a wide variety of interdisciplinary careers in resource management, fisheries and wildlife biology, health sciences, genetics, microbiology, science communications (technical writing, journalism, and nature interpretation), and many other fields. About 40 percent of Biology graduates pursue advanced degrees in graduate or professional schools in medicine, dentistry, veterinary science, biological sciences, wildlife biology, or ecology and conservation biology. Students at UW-Green Bay also can combine a Biology degree with a program in primary or secondary school education.

Graduates of UW-Green Bay's Biology program are employed today in government agencies (U.S. Environmental Protection Agency, Food and Drug Administration, Fish and Wildlife Service, Forest Service, Bureau of Land Management, Department of Agriculture, Wisconsin Department of Natural Resources, local government agencies); hospitals and clinics, including veterinary hospitals and zoos; private corporations (pharmaceuticals, food processing, agriculture, etc.); environmental consulting firms; conservation organizations; and educational institutions ranging from elementary schools to universities.

Biology majors combine their studies with an interdisciplinary minor. Human Biology is commonly chosen as a minor by Biology majors with interests in pre-medicine, health sciences or exercise science. Students interested in ecology, biodiversity conservation, and management of biological resources such as wildlife, forests, and fisheries, typically combine a minor in Environmental Science. Other popular interdisciplinary subjects for Biology majors include Business Administration and Environmental Policy and Planning.

Students who prefer a Biology minor (rather than a major) select an interdisciplinary major. Most students with a Biology minor choose majors in Environmental Science or Human Biology. Students who desire to become science teachers often combine the Biology major with the professional program in Education. Information about teacher certification requirements can be found at the UW-Green Bay Education Office.
UW-Green Bay's Biology program provides outstanding opportunities for students to gain practical experience. Many undergraduates work with faculty on field or laboratory research projects. Internships are widely available with private industry, public agencies, and non-profit organizations. These hands-on experiences are critical for developing a competitive resume for the job market or admission to graduate and professional schools.

The Biology program has well-equipped laboratories for coursework and faculty-guided research. In cellular and molecular biology laboratories, students become familiar with techniques of tissue culture, in situ hybridization, affinity chromatography, agarose and polyacrylamide gel, electrophoresis, polymerase chain reaction, and the use of monoclonal antibodies. In physiology laboratories, students learn techniques to study physiological functions. Teaching and research facilities available to ecology and conservation biology students include the Cofrin Center for Biodiversity, the 290-acre Cofrin Memorial Arboretum surrounding the UW-Green Bay campus, four off-campus natural areas managed by the University, the Richter Natural History Museum, small animal laboratory, the Gary A. Fewless Herbarium, a greenhouse, and state-of-the-art computer labs. Advanced undergraduates are able to participate in research projects on Great Lakes ecosystems, northern forests, agroecosystems, rivers, lakes, wetlands, and even tropical forests and mangroves.

Students in the Biology major develop basic skills such as statistical design and analysis, laboratory proficiency, and familiarity with major taxonomic groupings of plants, animals, and microorganisms. Many high paying occupations today require a college-educated individual who can write and speak well, solve problems using a scientific approach, learn new information quickly, and work well with others on a team. UW-Green Bay's Biology students acquire and apply these skills with excellence.

This disciplinary major also requires:
Completion of an interdisciplinary major or minor
Completion of one of the following areas of emphasis:

- Animal Biology
- Biology for Educators
- Cell/Molecular
- Ecology and Conservation

Animal Biology Emphasis

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major or minor

Supporting Courses		**28-29**
BIOLOGY 201 & BIOLOGY 202	Principles of Biology: Cellular and Molecular Processes and Principles of Biology Lab: Cellular and Molecular Processes	
BIOLOGY 203 & BIOLOGY 204	Principles of Biology: Organisms, Ecology, and Evolution and Principles of Biology Lab: Organisms, Ecology, and Evolution	
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
CHEM 212 & CHEM 214	Principles of Chemistry II and Principles of Chemistry II Laboratory	
MATH 260	Introductory Statistics	
Mathematics (choose one course):		
COMP SCI 256	Introduction to Software Design	
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 201	Calculus for the Management and Social Sciences	
MATH 202	Calculus and Analytic Geometry I	
Writing (choose one course):		
ENG COMP 105	Expository Writing	
INFO SCI 390	Technical Writing	
Upper Level Courses		**30-33**
Required courses		
BIOLOGY 302	Principles of Microbiology	
or BIOLOGY 307 & BIOLOGY 308	Cell Biology and Cell Biology Laboratory	

BIOLOGY 303	Genetics
BIOLOGY 309	Evolutionary Biology
BIOLOGY 311	Plant Physiology
or BIOLOGY 346	Comparative Physiology
ENV SCI 302	Principles of Ecology
Choose 12-14 credits from the following courses:	
BIOLOGY 304	Genetics Laboratory
BIOLOGY 322	Environmental Microbiology
BIOLOGY 340	Comparative Anatomy of Vertebrates
BIOLOGY 341	Ichthyology
BIOLOGY 342	Ornithology
BIOLOGY 343	Mammalogy
BIOLOGY 345	Animal Behavior
BIOLOGY 346	Comparative Physiology
BIOLOGY 353	Invertebrate Biology
BIOLOGY 355	Entomology
BIOLOGY 410	Developmental Biology
BIOLOGY 411	Developmental Biology Laboratory
HUM BIOL 402	Human Physiology
HUM BIOL 403	Human Physiology Laboratory
HUM BIOL 413	Neurobiology
HUM BIOL 422	Immunology
HUM BIOL 423	Immunology Lab
HUM BIOL 444	Endocrinology
Seminar, 1 credit required	
BIOLOGY 490	Biology Seminar
Total Credits	**58-62**

Cell/Molecular Emphasis

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major or minor

Supporting Courses	**28-29**

BIOLOGY 201 & BIOLOGY 202	Principles of Biology: Cellular and Molecular Processes and Principles of Biology Lab: Cellular and Molecular Processes	
BIOLOGY 203 & BIOLOGY 204	Principles of Biology: Organisms, Ecology, and Evolution and Principles of Biology Lab: Organisms, Ecology, and Evolution	
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
CHEM 212 & CHEM 214	Principles of Chemistry II and Principles of Chemistry II Laboratory	
MATH 260	Introductory Statistics	
Mathematics (choose one course):		
COMP SCI 256	Introduction to Software Design	
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 201	Calculus for the Management and Social Sciences	
MATH 202	Calculus and Analytic Geometry I	
Writing (choose one course):		
ENG COMP 105	Expository Writing	
INFO SCI 390	Technical Writing	
Upper Level Courses		**30-33**
Required courses		
BIOLOGY 302	Principles of Microbiology	
BIOLOGY 303	Genetics	
BIOLOGY 307	Cell Biology	
BIOLOGY 308	Cell Biology Laboratory	
BIOLOGY 309	Evolutionary Biology	
BIOLOGY 311 or BIOLOGY 346	Plant Physiology Comparative Physiology	
BIOLOGY 407	Molecular Biology	
ENV SCI 302	Principles of Ecology	
Minimum of 4 credits of the following courses:		
CHEM 300 & CHEM 301	Bio-Organic Chemistry and Bio-Organic Chemistry Laboratory	
CHEM 302 & CHEM 304	Organic Chemistry I and Organic Chemistry Laboratory I	
Choose a minimum of 5 credits from the following courses:		
BIOLOGY 304	Genetics Laboratory	
BIOLOGY 312	Mycology	

BIOLOGY 322	Environmental Microbiology	
BIOLOGY 402	Advanced Microbiology	
BIOLOGY 408	Molecular Biology Laboratory	
BIOLOGY 410	Developmental Biology	
BIOLOGY 411	Developmental Biology Laboratory	
CHEM 330	Biochemistry	
CHEM 331	Biochemistry Laboratory	
HUM BIOL 422	Immunology	
HUM BIOL 423	Immunology Lab	
HUM BIOL 444	Endocrinology	
Seminar, 1 credit required		
BIOLOGY 490	Biology Seminar	
Total Credits		**58-62**

Ecology and Conservation Emphasis

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major or minor

Supporting Courses		**28-29**
BIOLOGY 201 & BIOLOGY 202	Principles of Biology: Cellular and Molecular Processes and Principles of Biology Lab: Cellular and Molecular Processes	
BIOLOGY 203 & BIOLOGY 204	Principles of Biology: Organisms, Ecology, and Evolution and Principles of Biology Lab: Organisms, Ecology, and Evolution	
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
CHEM 212 & CHEM 214	Principles of Chemistry II and Principles of Chemistry II Laboratory	
MATH 260	Introductory Statistics	
Mathematics (choose one course):		
COMP SCI 256	Introduction to Software Design	
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 201	Calculus for the Management and Social Sciences	
MATH 202	Calculus and Analytic Geometry I	
Writing (choose one course):		
ENG COMP 105	Expository Writing	

INFO SCI 390	Technical Writing	
Upper Level Courses		**30-33**
Required Courses		
BIOLOGY 302	Principles of Microbiology	
or BIOLOGY 307 & BIOLOGY 308	Cell Biology and Cell Biology Laboratory	
BIOLOGY 303	Genetics	
BIOLOGY 309	Evolutionary Biology	
BIOLOGY 311	Plant Physiology	
or BIOLOGY 346	Comparative Physiology	
ENV SCI 302	Principles of Ecology	
Choose 12-14 credits from the following courses:		
BIOLOGY 310	Plant Taxonomy	
BIOLOGY 311	Plant Physiology	
BIOLOGY 312	Mycology	
BIOLOGY 320	Field Botany	
BIOLOGY 322	Environmental Microbiology	
BIOLOGY 342	Ornithology	
BIOLOGY 343	Mammalogy	
BIOLOGY 353	Invertebrate Biology	
BIOLOGY 355	Entomology	
ENV SCI 401	Stream Ecology	
ENV SCI 467	Capstone in Environmental Science	
ENV SCI 469	Conservation Biology	
ENV SCI 499	Travel Course	
Seminar, 1 credit required		
BIOLOGY 490	Biology Seminar	
Total Credits		**58-62**

Biology for Educators Emphasis

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major or minor

Supporting Courses	**28-29**

BIOLOGY 201 & BIOLOGY 202	Principles of Biology: Cellular and Molecular Processes and Principles of Biology Lab: Cellular and Molecular Processes	
BIOLOGY 203 & BIOLOGY 204	Principles of Biology: Organisms, Ecology, and Evolution and Principles of Biology Lab: Organisms, Ecology, and Evolution	
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
CHEM 212 & CHEM 214	Principles of Chemistry II and Principles of Chemistry II Laboratory	
MATH 260	Introductory Statistics	
Mathematics (choose one course):		
COMP SCI 256	Introduction to Software Design	
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 201	Calculus for the Management and Social Sciences	
MATH 202	Calculus and Analytic Geometry I	
Writing (choose one course):		
ENG COMP 105	Expository Writing	
INFO SCI 390	Technical Writing	
Upper Level Courses		**30-33**
Required courses		
BIOLOGY 302 or BIOLOGY 307 & BIOLOGY 308	Principles of Microbiology Cell Biology and Cell Biology Laboratory	
BIOLOGY 303	Genetics	
BIOLOGY 309	Evolutionary Biology	
BIOLOGY 311 or BIOLOGY 346	Plant Physiology Comparative Physiology	
ENV SCI 302	Principles of Ecology	
Choose 12-14 credits of the following areas:		
Animal Biology (minimum of one course):		
BIOLOGY 304	Genetics Laboratory	
BIOLOGY 340	Comparative Anatomy of Vertebrates	
BIOLOGY 342	Ornithology	
BIOLOGY 343	Mammalogy	
BIOLOGY 345	Animal Behavior	
BIOLOGY 346	Comparative Physiology	
BIOLOGY 353	Invertebrate Biology	

BIOLOGY 355	Entomology	
BIOLOGY 410	Developmental Biology	
BIOLOGY 411	Developmental Biology Laboratory	
Ecology and Conservation Biology (minimum of one course):		
BIOLOGY 310	Plant Taxonomy	
BIOLOGY 320	Field Botany	
BIOLOGY 342	Ornithology	
BIOLOGY 343	Mammalogy	
BIOLOGY 353	Invertebrate Biology	
BIOLOGY 355	Entomology	
ENV SCI 467	Capstone in Environmental Science	
ENV SCI 469	Conservation Biology	
ENV SCI 499	Travel Course	
Cell/Molecular Biology (minimum of one course):		
BIOLOGY 302	Principles of Microbiology	
BIOLOGY 304	Genetics Laboratory	
BIOLOGY 307	Cell Biology	
BIOLOGY 312	Mycology	
BIOLOGY 402	Advanced Microbiology	
BIOLOGY 407	Molecular Biology	
BIOLOGY 408	Molecular Biology Laboratory	
CHEM 330	Biochemistry	
CHEM 331	Biochemistry Laboratory	
HUM BIOL 422	Immunology	
HUM BIOL 423	Immunology Lab	
HUM BIOL 444	Endocrinology	
Seminar, 1 credit required		
BIOLOGY 490	Biology Seminar	
Total Credits		**58-62**

MEMO

To: Scott Furlong, Dean of Liberal Arts & Science
From: Christine Style, Chair of AAC
Date: 5 March 2009

Re: Academic Affairs Council Review of Biology Program Review dated May 2008

Biology is a disciplinary program that offers 4 distinct areas of emphasis for the Biology major and one program of study for the Biology minor. The four major areas of emphasis are: 1) Plant Biology; 2) Animal Biology; 3) Field Biology and Ecology; and 4) Cell/Molecular Biology. In 2005 there were 178 Biology majors and there were 7 students taking the minor. In addition to delivering the Biology major and minor, the program provides courses that are required by the Human Biology, Chemistry and Environmental Science programs. For the General Education program, the program offers BIOL 202, one of only two courses that can be used to satisfy the HB1 requirement. In the 2008 calendar year 481 students took this course. Being a disciplinary program, biology majors are required to complete an additional interdisciplinary major or minor. The majority of the biology majors complete their interdisciplinary requirement by completing the requirements for the Human Biology major or minor. The AAC cannot tell if the popularity of this combination is due to the desire of students to combine the studies of these two areas or due to the similarities of the program requirements for these two areas. The AAC observed that the Human Biology minor only required 6 additional upper level credits over the Biology major and that an array of courses that would satisfy the requirements for the Human Biology major would, with the addition on only one additional course, also satisfy the requirements for a Biology major. The AAC recommends that the faculty of these two programs work together to develop either two distinctly different majors or failing this, combine these two programs under one degree program. Additionally, a clear and unique mission statement for Biology is needed and an assessment process should be implemented.

The AAC sent a set of questions to the Biology chair in advance of the review. Below summarizes the discussion and reflections afterwards:
The AAC asked about class size interfering with implementation of the biology assessment plan and the rationale for recruiting new students. Prof Merkel responded that the recruitment plan is to improve the quality of students rather than increase student numbers and that the implementation of an entry requirement is being considered. The AAC comments that improving quality is good, however it seems that marketing is driven by Environmental Sciences and that the Biology program hopes to benefit from it. There has been no marketing plan put forward on behalf of the Biology program as a standalone and unified entity. This brought the AAC to question the rationale as to why Biology is a separate program when most of its members claim their home unit to be Human Biology. Of the 15 faculty listed on the Biology website, only 3 of them list Biology as their unit (Howe, Draney, Dornbush). How can there be an effective assessment of the Biology program without cohesive ownership in the program?

Prof. Merkel shared with the AAC his thoughts for improving assessment of the Biology program that included the following:

Short term: 1) Re-implement exit surveys for Biology majors and minors that will include plans students may have for graduate school and entrance exam scores. 2) Develop a mechanism to maintain and track students after they graduate - their success in getting into graduate school.

Intermediate goal: Re-implement the administration of a standardized test. It is expensive. Pitfalls to using the test include the challenge of having the curriculum framed so the test can be delivered to students with different learning experiences and set goals. Participation is also a problem - what incentive students have to take it. Prof Lorenz offered his solution (offering students the option of taking the standardized test instead of the final exam) to this problem that worked well and Prof. Merkel noted it as a possibility.

Long-term Goal: Develop a capstone course to shape the curriculum to lend itself to assessment. Develop a portfolio mechanism for assessment that starts when the student is a freshman and continues to graduation. A capstone course would complete and review the student's portfolio.

The AAC suggested that the Education model could be more easily implemented (instead of a capstone course) this model has an advisor review the completed portfolio before the student graduates.
While all of the above may be good solutions for improving assessment, assessment begins with a clear understanding of common learning outcomes that all Biology majors have no matter what their area of emphasis and that these outcomes include components that make the Biology program distinct from Human Biology. It will also be important for the Biology program to review their mission statement and to clearly state goals that are unique from Human Biology.
The AAC asked if the change in the Introductory Biology sequence brought about the desired results. It is too early to tell as it was implemented in fall 2007 however in Fall 2008 enrollment in BIOL 202 was 313 students and enrollment in BIOL 203 was 72 students and spring 2008 enrollment in BIOL 202 was 144 and BIOL 203 was 108 (cap of 120). This seems to indicate that students tend to take BIOL 202 first.

The AAC asked about Gen Ed students that expressed some dissatisfaction with the learning experiences and what may have attributed this to. Prof. Merkel responded that class size was one factor that may lead to student dissatisfaction but BIO 202 has a high student failure rate primarily due to poor advising. Students need to be advised properly as BIO 202 is primarily for majors and minors in Biology and Human Biology. Students are being put into this 4-credit lecture/lab course for the wrong reasons. The interdisciplinary Human Biology program is in the process of creating an optional lab component for HU M BIOL 102 Intro to Human Biology (a course not used by the Biology or Human Biology major or minor and used primarily for General Education). The Biology chair also pointed to the survey question as being too broad and problematic. The AAC noted that the class size for BIOL 202 is 168 for the Lecture and the lab is capped at 24. Advising needs to improve and the addition of the lab option for HUM BIOL 102 is a good direction but this is not a course controlled by the Biology program.

The AAC asked about the student feedback that seems to indicate that students don't feel that the program has given them a completive edge over graduates from other institutions. What do the faculty see as needing to be done to provide that edge? Prof. Merkel responded that improving student/teacher ratio may help but may not be the entire answer. He said that the survey question is too broad as it implies that students have enough knowledge to compare the UWGB Biology program with other institutions. Prof Merkel said that the Biology Program could do a better job at tracking results of where students go after they graduate as entrance into grad school is required for most Biology jobs. Prof. Merkel referred to UW-River Falls as a good model for the UWGB Biology Program to look at. The AAC noted that no answer was given regarding what the Biology program faculty see as what the program does or could do to give the UWGB Biology program a competitive edge over other programs. UW-River Falls has a cohesive and unified program of study and faculty dedicated to Biology, with Human Biology encapsulated with it.
The AAC asked about the relationship between Biology and Human Biology. No dear answer was given. The AAC noted that upon looking at the catalog offerings of both programs many of the courses overlap and are used by both programs. Biology offers four major emphasis choices: Plant; Animal; Field; and Cell/Molecular. Human Biology offers five major emphasis choices: General; Health Science; Exercise Science; Cytotechnology: and Nutritional Science/Dietetics and two tracks for the minor: General Human Biology and
Applied Human Biology. Environmental Science also uses BIOL 202 and 203 as required courses in their major and Environmental Policy and Planning requires both courses as well. The American Chemical Society-Certified Major in Environmental Chemistry requires BIOL 202 and 302. Psychology includes BIOL 202 as one of two courses to pick from in the major.
The AAC recommends that the Biology Program do the following:

1. Biology and Human Biology should reevaluate their relationship and structure.
2. A clear and unique mission statement is needed before assessment planning can begin.
3. The assessment plan that was outlined by Prof. Merkel at the meeting (and noted above) is good and should be implemented as soon as possible.

cc: Associate Dean Donna Ritch Brian Merkel, Biology chair
Michael Draney (former chair of Biology) Associate Provost Tim Sewall
AAC members

UNIVERSITY of WISCONSIN .
GREEN BAY

Date: March 17, 2009

To: Brian Merkel, Biology Chair

From: Scott Furlong, Dean of Liberal Arts and Sciences

Re: Report on the Biology Program Review

The Biology program at the University of Wisconsin-Green Bay is a disciplinary program with four emphases as well as a minor. In addition to serving majors in Biology, the program is involved in offering courses that meet general education requirements (primarily the Biology 202 class) and also serve other university programs particularly in Human Biology, Environmental Science and Education. A number of the faculty are also involved in the graduate program in Environmental Science and Policy. The AAC noted a need to implement the planned assessment plan for the program. They also noted some concern regarding the overlap of programs, which I'll address later in the document. I will note at this time though that it is common throughout the university that disciplinary faculty are spread across units so I do not see any unique concern with the fact that Biology faculty reside in both Human Biology (HUB) and Natural and Applied Science (NAS). Biology has hired a number of new faculty since its last program review and successfully integrated these faculty into the program. In addition, a number of them have been successful in variety of activities such as grant development, international travel courses, and course/curriculum development. It should also be noted that there has been a significant increase in the number of independent learning opportunities provided to our students.

Enrollment Trends/Resource Issues:
The Biology program has averaged about 170 majors over the past five years and this has remained steady. It does not have very many minors probably because of students' abilities to double major in either Human Biology or Environmental Science taking a minimum number of courses. Over the past five years almost 50% of the Biology majors also majored in Environmental Science and 35% doubled majored in Human Biology. Faculty in Biology are housed in either HUB or NAS. The significant growth in the Human Biology major over the past five years presents some potential faculty resource issues for the Biology program. The AAC, though, is incorrect regarding the number of faculty in each of these two units. Based on the current undergraduate catalogue, HUB has nine biologists and NAS has five biologists (Associate Dean Donna Ritch is also listed as a Biology faculty). There seems to be a bit of an issue based on the data provided regarding the number of students that are graduated each year, which seems a bit low given the number of majors declared. This may need some additional research by the unit.

Since the last self-study, there have been some significant improvements in facilities and equipment. The renovation of Laboratory Sciences brought many needed upgrades, new dissecting and compound microscopes were purchased and the greenhouse facilities have been

improved with Lab Mod funding. While no specific equipment needs are listed in the self-study report, it is important to note the importance of keeping equipment and supplies as current as, possible and that often times it can be quite expensive to replace and restock these items.

Assessment:
The AAC notes rightly so concerns about the current lack of a student assessment plan for the Biology program. They also comment that it is important to have a "clear understanding of common learning outcomes that all Biology majors have no matter what their area of emphasis." I would agree with this statement. As part of the response to the AAC the Biology chair provided some ideas for both short and long terms goals to implement an assessment plan.

Curriculum Development/General Education:
There have been a few changes to the Biology curriculum including the addition of a required course Evolutionary Biology, a change to the .Biology 202 and 203 sequence so that students do not have to take 202 before 203. In addition, the addition of two travel courses to Costa Rica and Panama has provided some unique opportunities to the students.

Biology 202 is currently listed as a general education course that meets the HB-1 designation. The Biology (and Human Biology) faculty have raised concerns that Biology 202 should really be for science majors and not taken primarily as a general education course for non-science majors. One might even question whether this course fits within the context of the RB-I learning outcome. There are curriculum changes currently working their way through the system regarding these issues, but the issues should be explored further.

Biology may want to consider its current list of emphases and determine whether they are truly unique. There are a number of situations within the Biology four emphases where a student could take the same courses and get a different emphasis. Some examples:

- Students can take Bio 342, 343, and 353 and have an emphasis in either Animal Biology or Field Biology and Ecology
- Students can take Bio 310, 320, and 363 and have an emphasis in either Plant Biology or Field Biology and Ecology.

Faculty should examine this and determine what the distinctions are in these situations. Are the learning outcomes different for the four emphases? Should there be particular courses that are required for each emphasis to ensure that students are learning the appropriate information? I believe that the Plant Biology and Field Biology/Ecology are the two areas that should be examined most closely. Based on data from the Office of Institutional Research, 73% of the students that complete the Plant Biology emphasis also complete the Field Biology and Ecology emphasis. I also note a large number of upper-level courses and wonder if courses may compete against one another in terms of enrollments. I am also a bit concerned about how this may affect faculty workload because of the potential number of preparations.
The AAC implies that there is not much distinction between the Biology and Human Biology programs based on faculty and course overlap. I would tend to disagree and state that these two programs do serve different missions from my perspective. The tracks in Human Biology (except

possibly the Cytotechnology track) seem quite distinct. It may not be a bad idea for the two programs to better distinguish themselves from one another through their learning outcomes or courses, but I do not believe that the program should be combined into one degree program.

In summary, the program in Biology has a healthy number of majors with faculty that are committed to their students. There are some assessment and curricular issues that need some attention. If you would like to meet with me regarding this review, please let me know.

Cc: Christine Style, Academic Affairs Council Tim Sewall, Associate Provost

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Wolf, A., R. Condit, and S. Davies. 2009. Ecological Insights from long-term research plots in tropical and temperate forests. **Bulletin of the Ecological Society of America** 90: 519-525.

Wyant, K.A., Draney, M.L. and Moore, J.C. 2011. Epigeal spider (Araneae) communities in moist acidic and dry heath tundra at Toolik Lake, Alaska. **Arctic, Antarctic, and Alpine Research** 43: 301-312.

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Research Grants

2015. Howe, R.W., A.T. Wolf, and R. Webster. A Partnership to Reduce Nonpoint Source Pollution and Improve Riparian Habitat in the Wequiock Creek Watershed of Brown County, Wisconsin. **Wisconsin Coastal Management Program**. $59,672.

2014. **Forsythe, P.S.** and T. Strakosh (USFWS). Department of the Interior, United States Fish and Wildlife Service. *Landscape surveillance of native and non-native larval fish distribution and occurrence in upper and lower waters of Green Bay*. $65,467

2014. **Forsythe, P.S.** and S. Hansen (Wisconsin DNR). Great Lakes Protection Fund and Wisconsin DNR. *Larval lake whitefish outmigration from Lake Michigan tributaries with respect to timing, abundance, and vertical distribution*. $41,507

2014. **Forsythe, P.S.** and M. Donofrio (Wisconsin DNR). Oconto Electric Cooperative and Wisconsin DNR. *Spatio-temporal assessment of larval lake sturgeon production and behavior during outmigration drift in the Oconto River, Wisconsin*. $14,565

2014. **Forsythe, P.S.**, G. Lamberti (Notre Dame), D. Uzarski (C Michigan) and M. Berg (Loyola). Wisconsin Sea Grant and Illinois/Indiana Sea Grant. *Coastal wetland – nearshore linkages in Lake Michigan for sustaining sport fishes*. $440,000 ($220K to UWGB; $220K to Notre Dame)

2014. Howe, R.W., A.T. Wolf, M. Grimm, L. Last, and N. Van Helden. Lower Green Bay and Fox River Area of Concern (AOC) Habitat Restoration Plan and Path Toward Delisting. **Wisconsin Department of Natural Resources and U.S. Environmental Protection Agency**. $464,052 (over 2 years).

2014. Howe, R., T. Prestby, and A. Wolf. Habitat Management for Migratory and Breeding Birds at the Cat Island Restoration Project. **Wisconsin Department of Natural Resources**. $6,885.

2014-17. Dornbush, M.E., R. Howe, P. Robinson, A. Wolf, B. Kupsky, and T. Prestby. **Ducks Unlimited**. Restoring Green Bay Aquatic Vegetation and Avifauna. $226,781 (non-match award amount: $155,782).

2014-17. Grubisha, L.C. and P.J. Cotty. Population structure of *Aspergillus flavus* communities in Wisconsin. **United States Department of Agriculture**, **Agricultural Research Service** $60,000

2013-15. Howe, R.W. and A.T. Wolf. Restoring Fish Habitat in Green Bay's Wequiock Creek Estuary (WI). Sustain Our Great Lakes Program. **National Fish and Wildlife Foundation. Sustain Our Great Lakes Program**. $122,989

2012-14. Wolf, A., R. Howe, B. Galbraith, G. Van Vreede, and J. Huff. Coastal Wetland Restoration at the Pt. Sable Nature Preserve (WI). **National Fish and Wildlife Foundation, Sustain Our Great Lakes Program**. $150,000

2013. Czesny (INHS), S. Thomas (INHS), J. Chick (INHS) and **Forsythe, P.S.** Department of the Interior, U.S. Fish and Wildlife Service. *Survey of the Lake Michigan microzooplankton community: critical information for understanding the risk from aquatic nuisance species*. $15,060.

2013. **Forsythe, P.S.** and S. David (Shedd Aquarium). John G. Shedd Aquarium (). *The effects of dam removal and habitat restoration on migratory fishes of the Green Bay with emphasis on Northern Pike*. $17,850.

2013. **Forsythe, P.S.** and S. David (Shedd Aquarium). Environmental Protection Agency and Nature Conservancy. *Effects of dam removal on a Great Lakes tributary to inform the management and conservation of native fish species.* $12,020.

2013. **P.S. Forsythe.** Oconto Electric, U.S. Fish and Wildlife Service, and Wisconsin Department of Natural Resources. *Assessment of larval lake sturgeon production and drift below Stiles Dam, Oconto River*. $12,893.

2013. Wolf, A.T., R. W. Howe, and G. Fewless. Wabikon Forest Dynamics Plot Re-Census. **Smithsonian Institution and The 1923 Fund (Cofrin Family Foundation)**. $110,000.

2012-13. Rodriguez-Estrada, A., A.Wolf, R. Howe, and J. Wondergem. Undergraduate Research to Engage Multicultural Students at UW-Green Bay. **National Science Foundation** (Wisconsin Alliance for Minority Participation/WiscAMP). $19,200.

2012. **P.S. Forsythe.** North American Hydro, U.S. Fish and Wildlife Service and Wisconsin Department of Natural Resources. *Assessment of larval lake sturgeon production and drift below the Menominee Dam Menominee River*. $35,789**.**

2011. Howe, R.W. and E. Gnass. Developing a Robust Indicator of Forest Health Based on Breeding Bird Assemblages. **The Nature Conservancy**. $4,293.

2011. Howe, R.W. Western Great Lakes Long-Term Bird Monitoring Project. **U.S. Forest Service**. $11,997.

2011. **P.S. Forsythe.** Great Lakes Restoration Initiative, Environmental Protection Agency and the Wisconsin Department of Natural Resources. *Lower Sheboygan River AOC Benthic Habitat Mapping and Improvement Study*. $39,854.

2010. Uzarski, D. G. + 21 co-investigators (including R. W. Howe). Great Lakes Indicators Collaboration (GLIC): Implementing Great Lakes Coastal Wetland Monitoring. **U.S. Environmental Protection Agency** Funding Opportunity # EPA-R5-GL2010-1. $10,000,000 for 2010-2015 ($232,675 to UW-Green Bay).

2010. Point au Sable Coastal Wetland Acquisition. **U.S. Fish and Wildlife Service/Fox River Damage Assessment Program**. $155,000.

2010. Howe, R. and E. Gnass. A strategy for monitoring forest condition at the Wild Rivers Legacy Forest in Northeastern Wisconsin. **The Nature Conservancy, Wisconsin Chapter**. $7,537.

2010. Howe, R.W. Improving the Birder Certification web site. **U.S. Fish and Wildlife Service**. $8,857.

2009. Wolf, A., R. Howe, A. Bauer-Dantoin, and M. Zorn. Raising Graduation Rates of Minority Science Students through Junior and Senior Level Research Experiences. Wisconsin Alliance for Minority Participation (WiscAMP), **National Science Foundation**. $23,600.

2008-09. Howe, R.W. and A.T. Wolf. Wabikon Forest Dynamics Plot. $115,000. Cofrin Center for Biodiversity, University of Wisconsin-Green Bay. (**1923 Fund**).

2009. Redell, D., P. White, R. Howe, A. Wolf, and J. Huebschman . Acoustic bat surveys: Assessing species status & trends in Wisconsin. **Wisconsin DNR State Wildlife Grant**. $40,822.

2009. Howe, R.W. and A.T. Wolf. Baseline inventory of woody plants at the Wabikon Forest Dynamics **Smithsonian Tropical Research Institute**. $25,000.

2008. Wolf, A., R. Howe, A. Bauer-Dantoin, and M. Zorn. Developing a Culture of Opportunity for Minority Science Students at the University of Wisconsin-Green Bay. Wisconsin Alliance for Minority Participation (WiscAMP**)**, **National Science Foundation**. $23,600.

2008. Howe, R.W. Northeastern U.S. Birder Certification Program**. U.S. Fish and Wildlife Service and National Park Service**. $35,000.