Department of Biological Sciences
Strategic Plan
(2010-2015)

VISION
The Department of Biological Sciences will be widely recognized as a department emphasizing an integrative approach to biological questions, both in teaching and research, from the molecular to the global level.

MISSION
The Department of Biological Sciences will serve both faculty and students (undergraduate and graduate) from the Commonwealth of Virginia, across the United States, and around the world. This will be accomplished through high quality research and teaching, generating and disseminating knowledge across the spectrum of biological subdisciplines. Students will gain an appreciation for biology as a scientific discipline, become scientifically literate, and understand the importance of biology in their daily lives. The department will prepare its majors and graduate students for careers in biological sciences, and instill non-majors with knowledge to be educated citizens capable of informed decisions with regard to the role of biology in public policy.

SHARED VALUES
The Department of Biological Sciences values excellence in all aspects of teaching and research, upholds the ethical practices of science, encourages diversity in students, staff, faculty, and perspectives, and seeks to build a sense of community at both the local and global scale.

GOALS
The overriding goals of the department are to maintain an up-to-date and effective curriculum for undergraduate and graduate students and a modern research program that serves the biological sciences community. To accomplish this we must maintain sufficient faculty and staff to cover core teaching and research areas, and further programmatic diversity by adding faculty whose expertise spans hierarchical levels and connects the sub-disciplines within biology. We shall also strive to improve the quality and knowledge of our students, increase faculty research productivity, and foster diversity among students, faculty, and staff.

METRICS
Factors that will be used to examine the success of these goals include: student, staff and faculty numbers, faculty and student publications, external funding, service, and student success (e.g. grades, standardized test scores, diversity, retention, and employment). We must also carry out regular curriculum review and student assessment to ensure we are maintaining a high standard of education.
RESOURCES & ACTIVITIES SUPPORTING THE MISSION OF THE DEPARTMENT

To meet our goals and fulfill our mission three general activity areas require resources within the department:

1. Generate and disseminate knowledge across the spectrum of biological subdisciplines.

   These activities require research faculty and staff support. They also require development and enhancement of infrastructure such as research laboratories and core facilities, to allow us to establish stronger undergraduate research programs, and enhance both doctoral and masters' programs. These activities should be accompanied by international collaborations and participation in national and regional committees and panels.

2. Improve student scientific literacy, provide an appreciation of biology as a scientific discipline, and instill in our students an understanding of the importance of biology in the worldview.

   Teaching our students, both undergraduate and graduate, is fundamental to all our goals. To meet these teaching goals we must have the resources to provide top quality instruction across the undergraduate and graduate curricula, and to provide outstanding general education classes for non-majors. This requires infrastructure to support our teaching needs including, but not limited to, a variety of modern teaching laboratories, mediated classrooms, and access to field sites.

3. Prepare students for careers in biological sciences and to participate in public service.

   The ultimate goal of education is to make our students employable and help them be productive citizens irrespective of their ultimate career goals. This can best be accomplished by providing current and exciting undergraduate, graduate, and pre-professional curricula; active and timely student advising; undergraduate research opportunities; strong mentoring of graduate and undergraduate students; and relevant practicum and internship opportunities. In addition we need to continue to enhance our secondary education curriculum. These teachers are the ones who are going to teach our incoming students, so if we are to increase the standards of the incoming students we need to increase the quality/knowledge of their teachers by providing them with up-to-date information.

   Life is not all about classroom and labs, so we need participation in student clubs and organizations, as well as faculty and student representation and participation at local, regional, national, and international conferences. Real-world internships and opportunities to study at off-campus field stations or labs at national and international locales should be enhanced. Enhancing biological sciences can also be accomplished on a local level by participation in public service activities at all levels including various groups, clubs, organizations and K-12 schools.
Overview, Strategic and Developmental Plan for the Department of Biological Sciences.

The Department of Biological Sciences is undergoing a major evaluation of its programs, both at the undergraduate and graduate level. Although we have been heavily impacted by the current, and prior, budget cuts, the department basics are still fundamentally sound, although we are deficient in some foundational areas of instruction. This is our view of the department now (January 2010) and where we want to be in 2013, 2015 and 2020, and is an outline to get there.

Our department has experienced a series of significant budget cuts over the last decade, including approximately 5% for each of the past two years and another possible 5% during the next year. At the same time, we have seen a double digit increases in student numbers in the biological sciences, while the number of full-time tenure/tenure track research-active faculty has decreased by approximately 20% over the last 10 years. Therefore, the first component of the strategic plan is to make sure we do not lose ground to other institutions/programs; the second will be to build and grow upon our strengths. Because of the reductions in faculty, we are starting with a high student to teacher ratio and large classes. However, hiring more faculty alone will not solve all of the problems with large sections, we must find new and innovative (for us at least) ways to improve the teaching and understanding of biology.

We cannot build a meaningful strategic plan without having meaningful goals. One way to set such goals and to measure our success in meeting them is to rank ourselves against other Biology programs. Unlike many disciplines, Biology is itself divided into many different sub-disciplines, making ranking difficult and somewhat arbitrary. Since many different constituents (students, potential new faculty, and granting agencies) compare and use these rankings, we cannot ignore them. Therefore we should use these rankings as a guide to the future development of the department. One such ranking is the National Research Council (NRC) report on graduate programs that is released every ten years. The last report was published in 1995; a new survey is due out this year. In the 1995 rankings Biological Sciences at ODU ranked 101/127 in the Ecology/Evolution and Behavior area and 138/187 in the Biochemistry and Molecular area. The new rankings will consist of 16 disciplines in the life sciences, not all of which are covered by our programs. This evaluation, when released, should be our starting point; however it must be remembered that this survey was started (2006) before the latest round of budget cuts.

This document therefore is a beginning, or starting point for open discussion about where our department should be in 3, 5 and maybe 10 years. By the end of 3 years we need to have made inroads into overcoming the cuts of the past, by 5 years confirmed ourselves as a strong Biology department within the state and mid-Atlantic region, and by 10 years setting ourselves up to be recognized as having one of the top-tier Biology departments/programs in the USA.
Where we are now, where should we go, and how do we get there?

The Department of Biological Sciences has 22 tenure/tenure track (T/TT) faculty, one senior lecturer, two visiting assistant professors, and four research active emeritus faculty. Of the T/TT faculty, two are in administrative positions in the Dean’s office, one is department chair (all of who have no or reduced teaching responsibilities) and two are extensively teaching faculty with no research responsibilities.

Currently we have approximately 1000 declared/intended undergraduate majors and 75-100 graduate students in one of three programs (MS in Biology, PhD in Biomedical Sciences, and PhD in Ecological Sciences). In the NRC report published in 1995 the two general areas within biology that were ranked were Ecology/Evolution and Behavior and Biochemistry and Molecular although this latter grouping is shared with Chemistry. The new fields in the Life Sciences area of the NRC report in which we have research faculty involvement include Cell Biology; Ecology and Evolutionary Biology; Genetics, Genomics and Bioinformatics; Immunology and Infectious Disease; Microbiology; Physiology; Entomology; and Plant Sciences. Other areas that are listed in which we do not have strengths are Biochemistry, Biophysics and Structural Biology, Developmental Biology, Neuroscience and Neurobiology, Pharmacology, Toxicology and Environmental Health, Animal Sciences, Food Sciences and Engineering, Nutrition, and the emerging fields of Biotechnology and Systems Biology. Although we still have a MS program in Biotechnology, this program needs to be revisited if it is to become successful. Some of these programs are obviously cross-disciplinary and we are starting to make inroads into developing programs in some of these areas. In particular the Biochemistry, Biophysics, and Structural Biology area would encompass the Bioelectrics program, as well as the Department of Chemistry and Biochemistry. Of course, we also need to consider our rankings at the undergraduate level, where ODU was listed as a tier 3 school in the 2008 US News and World Report.

The Department of Biological Sciences has traditionally been one of the strongest departments at ODU, ranking first or second in both research and teaching productivity in the College of Sciences. Inexplicably, but at least in part the result of sizeable budget cuts, our faculty, staff, and institutional support have been diminished over the years despite this productivity and the growing importance of biological sciences in society. If provided with the necessary resources, the Biology department can again shine and improve the ranking of ODU over the period of this plan; we have the high quality programs needed as a base for the future. Growth and improved rankings can be achieved by increasing the quality of our programs as seen by those external to the department and the university. We can increase our profile and reputation by better self-promotion and reporting of everything from student retention and graduation rates, to research funding, publications and awards. Three areas in which we can start to achieve this goal are (1) reduce class sizes, and therefore improve student: faculty ratios, (2) use new technologies in teaching, and make sure students are being taught up-to-date methodologies, and (3) enhance existing programs and develop new research areas that will put us on the cutting edge of biology programs. To accomplish this will
require increased levels of extramural funding (both total amounts and per capita funding), and increased quality of students, particularly graduate students.

**Faculty (recruitment, development and retention)**

**Current faculty:**
The department research active T/TT faculty consists of 11\(^1\) that would be considered in an Ecological, Organismal and Evolutionary Biology group and 7\(^2\) within a Microbiology, Immunology and Molecular Cell Biology group; some fall into both of these groupings. Other members of the faculty are teaching\(^3\) or in administrative positions\(^4\). In addition we have a number of emeritus faculty who continue to play an active role in the department\(^5\). We should set a goal of increasing to 30 the number of T/TT research active faculty evenly distributed between the graduate programs to ensure our graduate students are able to receive the educational opportunities they expect. A number of the new hires, like recent additions, would conduct research across biological disciplines. However, we must continue to ensure that the fundamental core areas of the various disciplines remain strong. New hires should be strategic to enhance existing areas of strength or develop new areas of research with careful consideration being given to highly regarded scholars in any appropriate area and/or to qualified candidates from under-represented groups. Consideration should also be given to establishing a critical mass of investigators from which centers could be developed. Additional consideration should also be given to the possibilities of trailing-spouses for such hires and opportunities for them, not only within the University but in the Hampton Roads area.

**Hiring Priorities:**
So how should we plan our next hires? Here we must consider the overall makeup of the department in terms of tenure decisions and attrition due to retirements and recruitment by other institutions. We must also take into account the areas affected by these losses as well as opportunities to strengthen existing research groups with strategic hires. Thirdly, but no less important, we must consider the future direction of biology in order to take advantage of new and emerging scientific and technical breakthroughs.

At what level should we be targeting our hires – beginning level or senior faculty? Can we hire top quality established investigators now or should we be developing young faculty at this time? Hires over the next few years will play a major role in the direction of the department and lay the ground work for the recruitment of nationally and/or internationally recognized scholars to more senior positions in the future. Likewise, consideration must also be given to the teaching needs to the department.

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\(^1\) Drs Bartol, Butler, Carpenter, Dauer, Day, Gordon, Horth, Motley, Musselman, Savitzky, Waller

\(^2\) Drs Cooper, Gauthier, Hargrave, Hynes, Oleszak, Ratzlaff, Swanson

\(^3\) Drs Nesius, Stevens and Kilburn (Senior lecturer – not tenure-track)

\(^4\) Drs Platsoucas and Osgood

\(^5\) Drs Marshall, Sonenshine, Holsinger and Rose
It is more difficult to predict our needs and the direction biology will take ten years from now. However, by that time at least 7 of the current faculty will be over 70, another 10 will be in their 60’s, while the rest should be in the prime of their academic careers. Therefore over the next 5 to 10 years we will need to hire 5-10 junior faculty to replace the senior faculty expected to retire between 2010 and 2020. The future of the department at that time will be in the hands of our current assistant and associate professors, as well as new hires. To ensure continued development and growth of the department we need to develop and retain the excellent faculty we have hired, and will hire in the next few years.

Prior to the hiring of new faculty at any level, we need to ensure that appropriate resources must be identified and available on hire. This includes both space and start-up funds. We cannot afford to repeat some of the problems we have had in the past with regard to start-ups. Identification of start-up funds and research space needs to be addressed at all levels – departmental, college and university.

Underrepresented groups:
The recruitment of underrepresented groups including women and minorities should be given serious attention in future hires. Of our T/TT faculty only 4 are female and only one is a minority. The department needs to make every effort to increase the number of high quality woman and minorities recruited for open positions without compromising the integrity of the faculty or the hiring process. We also need to ensure that these faculty are given every opportunity to succeed in their careers by providing appropriate mentoring, either from within the department, or, if needed, from other departments within the college. In addition we must address any departmental barriers, real or imagined, that exist to the success of women and minorities as productive members of the department faculty.

Faculty retention:
As we grow, the department should address retention of our current younger faculty; making them want to stay rather than looking for the opportunity to move on. As faculty invariably leave for other positions, we want this to be a reflection of our developing top quality faculty who are sought by other institutions. So, how do we develop and retain these current and future faculty?

Faculty development:
We should continue and expand our mentoring program for junior faculty, ensuring that they are being given appropriate feedback as they progress towards tenure. We should formalize this mentoring program, which could be expanded to include more formal and rigorous feedback (from the PT&C committee) on the progress towards tenure. The procedures involved should be streamlined, efficient, fit into our current procedures, and not merely add another layer of bureaucracy or assessment. Such a process would provide junior faculty with a critical assessment of their progress as determined by the PT&C committee.

Faculty research and development leave should be encouraged. These types of leave allow faculty to retool their research and give them opportunities to critically examine their programs. With the push for increased external peer-reviewed funding going to continue, it
can be expected that requests for research leave will require, by the end of the leave, submission of a proposal to a peer-reviewed funding agency. Development leave should also be made available to teaching faculty so they can develop new educational strategies as well as new courses.

With currently depleted faculty numbers development leave could lead to potential problems in ensuring coverage of the core courses and other classes essential to both our undergraduate and graduate curricula. Therefore we may be limited to a single faculty member being on leave at any time. As we return to increased funding levels and are given the opportunity to hire additional faculty this problem should be alleviated.

Research and Scholarship

Current funding:
The Biology department in FY 2006 submitted grant requests for over $8,000,000, and received funding of $2,800,000 from various sources (federal, state, local and private). Based on 21 T/TT research active faculty (numbers in 2006) this is a per capita funding of $133,333 (direct and indirect costs). In the past year the dollar amount of requests and therefore funding has decreased, but it is expected to increase again over the next few years as new proposal are submitted to agencies with deep funding pockets. As new faculty are hired our per capita income would be expected to decrease in the short term, but should increase as the new faculty become established. Increased funding will be important for increasing our overall reputation.

How do we maintain our ranking as one of the highest funded departments in the college/university? Obviously we must increase the number and size of research grants. A number of faculty have not submitted proposals for several years, have not received funding for some time, or have focused on small, short-term grant funding (in some cases not even covering the costs required by participating graduate students). The faculty must submit more and better proposals, and to submit them to larger, more affluent funding agencies. Also we must look at ways to increase the ability of faculty with funding to get more. One way to address this is to have research-focused and teaching-focused faculty.

We need to continue to apply for grants (research and teaching related) from all sources, including in particular those agencies with deep pockets. Although we have had success at obtaining funding from many of the major granting agencies we need to realize that everyone is competing for increasingly competitive and limited funds. Therefore, we need to ensure that the proposals sent out are of top quality. One way of enhancing such is the College of Sciences grant writer; we need to take advantage of this service not only to help write and critique grants but ensure that all the appropriate materials are included. In addition, we should consider an optional in-house mechanism of evaluation for proposals that are being prepared for submission. Small ‘study section’ groups could be established that would take a draft proposal and aggressively evaluate it and give feedback to the PI early in the submission process – well before the due deadline. Such evaluations can overcome some of the difficulty in maintaining an open perspective on one’s own research program; the independent
evaluation can provide such a perspective and help the investigator identify potential pitfalls at an early stage.

Not all fields of research have the same ability to attract funding; nor do they all have the same base of available funding. This does not lessen the importance of such fields. However, a long period of time without funding makes it difficult to re-establish a funded program. Thus, it is important that such faculty continue to be major contributors to the success of the department in different ways, such as through additional teaching or administrative assignments. The benefit is freeing up research active (funded) members of the faculty to continue and enhance their research program.

**Training grants:**
The department, college, and university should develop multi-investigator and training grants which can increase our research potential and recognition of the department and its programs at both the local and national level. These programs should be driven by the faculty, with support from the department, college and university. We have some areas of strength that could be, and should be, encouraged to put together both large disciplinary research groups and smaller interdisciplinary groups. Identifying such programs is important and can lead to identification of weaknesses that may be corrected through appropriate, targeted recruitment. Areas that we may want to consider are those disciplines appropriate for this department as outlined by the NRC for ranking research programs within the life sciences. Not all of these disciplines are represented in the department as it currently stands and may not be in the future, although some areas have been in the past (e.g. Neurobiology). This raises the question of which areas we want to develop.

**Ecological, Organismal and Evolutionary Biology development.**
The ecological sciences faculty have had a major role in the department contributing significantly to the development, research, and teaching over the years and continue to be among the top performers in terms or research grants and publications. Several faculty have been or are lead investigators on million dollar multi-institutional grants. The Ecological Sciences PhD program is strong and the number of high quality applicants continues to increase showing the importance of the program to the department and to the community.

One of strongest programs that we currently have in the department is that of marine ecology, broadly defined. This program could be enhanced by further cross departmental relationships as well as with other institutions in the area, in addition to continuing the international collaborations faculty already have established.

Another area that has a strong base are the plant sciences. We have two endowed chairs in this field and these should serve as the base of a major research area. These faculty need to significantly enhance their funding from research grants and forge collaborations for additional significant research funding, including the development of training grants. In addition the Orchid conservatory and greenhouse provide state of the art facilities for such research.

Within the Ecological, Organismal and Evolutionary Biology program areas identified as lacking faculty and fundamental to the curriculum and research programs include: Community
or Landscape Ecology, Quantitative Ecology, Invertebrate Ecology or Evolutionary Biology, and Marine Phycology. The specific hiring needs for this program will be driven by the needs of the department within the context of potential research programs.

**Microbiology, Immunology and Molecular Cell Biology development.**

Another area of strength within the department is in the general area of Microbiology, Immunology (including Virology, Parasitology, and Pathogenesis) and Molecular Cell Biology. This broad area will be one of our major focus areas for the duration of this plan. In addition to faculty hires we can enhance this program through the development of a campus-wide Microbiology and Immunology program that would involve different departments (Chemistry and Biochemistry, OEAS) as well as different colleges (Health Sciences). Such a program could also include faculty involved in Bioinformatics and Bioelectrics.

Weaknesses within the Microbiology, Immunology and Molecular Cell Biology area include limited funding and, like the ecological sciences, low faculty numbers. These areas require significant investment of funds and faculty funding of research in disease and health related research has been poor. We need to increase the level of funding by increasing the number of grant applications to health related agencies, in particular NIH. However, there also needs to be a significant investment on behalf of the University for teaching, at both the graduate and undergraduate level. Laboratories utilizing modern molecular methodologies are expensive and we currently have only limited equipment and supplies for this type of laboratory.

The PhD program in this area is currently undergoing revision and will be developed over the next few years. We have high quality students applying for the program, but due to limited funding and faculty not all are admitted.

**Future funding:**

In many cases all that is preventing the development of multi-investigator proposals is leadership. We need forward-thinking faculty to identify exciting areas of potential collaboration and get the process started. It will be from these groups that the needs for new faculty in a particular area will be seen, and if necessary targeted hires can be directed at a particular academic level (senior faculty hire). If this is recognized, then such hires need to be discussed as a group so that all faculty know the needs for future faculty hires and we can reach a consensus as to the direction of the department.

For smaller interdisciplinary programs faculty are to be encouraged to look outside the department for areas of collaboration. We already have faculty involved in the Bioelectrics program; we need to look for other additional opportunities, perhaps with Chemistry and Biochemistry, Ocean, Earth and Atmospheric Sciences, Health Sciences, and Engineering. Some faculty already have interactions with these departments and should be encouraged to pursue further research opportunities.

We as a department need to set a goal of receiving funding for graduate training through training grant programs such as the NSF IGERT program. Such programs will require the development of research concentration areas and collaborations with the department, across the college, and/or across campus. Possible programs that should be encouraged in this
direction during the next year or two would be the Marine Ecology group, the Plant science-related faculty, and the Microbiology and Immunology group. Hopefully other groups will also develop and develop projects that would be suitable for such training grants. Within the next 5 years additional areas should be developed to apply for such grants. We also need to think about developing post-doctoral training grants; these individuals will enhance our reputation when they leave for jobs in top quality institutions.

Teaching – Equitable Teach Load

The standard teach-load for faculty is 24 hours per academic year, which can be appropriately apportioned between teaching, research, and administration. In addition, other responsibilities which the chair should take into account include curriculum development, academic advising, supervision of theses and dissertations, supervision of student internships, service in professional organizations, and special community or university services. How the load is determined for the upcoming year is decided by the chair in consultation with the faculty at the time of the annual evaluation. In order to ensure that everyone in the department receives appropriate recognition, an equitable teaching load policy needs to be implemented. This policy allows for the recognition of different phases of our careers; those who are research-active would get some teaching relief, while others whose research is currently less productive (based on funding and peer reviewed publications) take on additional teaching responsibilities. Regardless of whether an individual faculty member contributes more to teaching or to research, we must recognize that there are significant contributions on both paths and that both need to be acknowledged as contributing to the success of the department. Doing this gives those who teach more a higher profile and restores honor to the teaching component of our careers.

That said, with our decreased faculty numbers we have to realize that equitable workload must be reportable. We cannot keep giving ‘research time’ to faculty who do not supervise graduate students, participate on graduate committees, and demonstrate research activity by generating research funding and refereed research publications. Therefore faculty with little or no research funding and/or publications over a period of time can expect increased teaching loads. The exception to this would be new junior faculty who are in the process of developing their research careers; they should continue to be given reduced teach-loads in order to establish their programs.

An important component of teach-load equitability is the commitment of all faculty to the Biology capstone course (Biol 405 – Seminar). In order to share the burden of an increasing number of students, all faculty must participate equally in the mentoring of students and the evaluation of the students’ papers and oral presentations. To ensure that this is done, faculty will be requested to take a minimum number of students as determined by enrollment for the semester; the number of students mentored will be a reportable part of the annual evaluation process.
Space

Simply put, we do not have adequate space to support our teaching and research. In many cases this is not a square footage issue, but a quality of space issue. We have, with the addition of the Physical Sciences Building, expanded the Biology department space on campus; this released some of the pressure on space within the department. However, if we want to grow, additional space will be needed. For those left in the Mills Godwin Building (MGB), the quality of our teaching and research space is a critical issue. This building is approaching 30 years of age and has not seen any major renovations. A number of our research labs are converted teaching labs and the remaining teaching labs are badly outdated. We need to address this issue.

In the long term, the construction of the new Chemistry/Life Sciences building should alleviate some of our problems. This is going to take some time, however, as the project still needs funding and state approval. A more near term solution being explored is to find funding for renovating space in MGB. An overview of possible changes to the building needs to be developed and different funding mechanisms for such renovations explored.

The goal of any space acquisition or renovation will be to obtain high quality research space and modern, updated teaching facilities (including teaching laboratories and undergraduate research laboratories). Areas must be recognized and set aside for core facilities and shared instruments and services. In addition, we need space available for the recruitment of new faculty; we must be able to show them available attractive laboratory and office space rather than making promises for future space, especially if the space is going to require significant renovations.

Undergraduate Education

The department now offers a well-structured undergraduate curriculum providing a broad overview of Biology. We continue to strive to provide the highest quality education to our students despite the significant increase in student numbers and the loss of a number of key faculty. Students will, by the time they graduate, have an understanding of the history, philosophy, and the ethics of science as well as a solid grounding in fundamentals of various sub-disciplines of Biology.

Advising:

To ensure that our graduates achieve this goal of a strong biology base we must adequately advise our students; this should be one-on-one where at all possible. Focused and interactive advising sessions provide the student with a sense of belonging to the department and not just being a number or lost in the crowd. In the workplace, graduate school, or professional school these students are a reflection on us and our programs. We need to take note of what they say about our programs.
Course evaluations:
Students do not complete online course evaluations. We must first, therefore, find a way to either increase participation in the evaluation process or, more simply, make it mandatory. With that accomplished, we must then turn our attention to the quality of information we gain from the evaluations – do they ask the questions we need answered, and are students taking them seriously?

Class size:
A major concern for both faculty and students is class size. For the student’s benefit, we should limit our class size to no more than 75. Beyond this size, pedagogical techniques become more limited and the classroom environment becomes less conducive to learning. The exception to this rule will be the introductory courses (Biol 108/109, 115/116, and 250/251) where individual attention is provided in small lab sections. This policy benefits faculty as well, as the time required to manage large classes is significantly greater than it is for small classes. Importantly, this fact must be recognized in workload analysis; faculty who teach classes of more than 75 students will receive more credit than those teaching smaller classes.

Other critical areas of concern that must be addressed are the loss of faculty, the need for modernization of our teaching (as well as research) laboratories, the need for rewarding excellence in teaching for all faculty including instructors, lecturers, visiting professors, and adjuncts.

Teaching methods:
We also need to look at our teaching methodologies – are they appropriate for the various types of courses we teach? Should we be using more “inquiry/research-guided” approaches in place of traditional lectures? If so, in which courses are they most appropriate? How can we be sure that our teaching methods are appropriate for our students – what teaching methods are they best equipped to learn from? Different types of courses undoubtedly lend themselves to different pedagogical approaches; we must also bear in mind that students today learn differently than we did.

Teaching faculty:
Recruitment of new faculty, in particular research faculty, is not going to significantly impact our ability to teach large numbers of new classes. Not only must we wait until we can hire new faculty, but we must also limit those faculty members’ teaching until they have had a reasonable opportunity to establish their research programs. One immediate fix is to hire well-qualified lecturers to teach the introductory and core courses. We need these people on board soon and must be able to retain them for a number of years to avoid the problem of scrambling to staff these critical classes at the last minute. As it currently stands, making such positions available would free up two T/TT faculty to teach additional upper level courses. In addition, we need a lecturer position to supervise the introductory labs (108/109, 115/116) and GTAs. This person should be able to evaluate existing labs and suggest new approaches and serve as a liaison between the faculty member and the GTAs.
We must also improve the ways in which we acknowledge the job our teaching faculty carries out. The college and university offer many opportunities for T/T TT faculty to receive awards for their research/teaching and service, but very few for teaching-only faculty leaving them under recognized. In addition we need to provide our teaching faculty with opportunities for professional development – for example, find funds for them to attend conferences and workshops that allow them to develop and then pass on new ideas to current faculty.

Teaching classrooms and laboratories:
Modernization of the teaching labs must be addressed. MGB was built nearly 30 years ago and has not been significantly renovated since then. The biological sciences have undergone revolutionary changes in that time, and our ability to keep our students on the cutting edge of the discipline is rapidly eroding. Our labs were simply not designed for the teaching of modern methodologies. Hence as indicated in the space portion of this document, monies must be acquired to renovate the laboratories. Along with such renovations we need to find space for undergraduate research projects.

Graduate Programs

To ensure our graduate programs are successful and competitive we must recruit top quality graduate students, and these will come from one of two groups of students – those interested in a particular faculty member or one of our programs, and those interested in ‘Biology’. With the sophistication of today’s applicants the high quality students are going to expect high quality programs and have high expectations from those programs. Expectations include access to top quality faculty, small class sizes, competitive stipends and tuition assistance/waivers for the duration of a degree program, and health insurance.

How do we meet these expectations? Most importantly, graduate programs need a plan to fund students. This must include a discussion of the number of students (PhD and/or MS) eligible for various levels of funding and for how long those students should be funded. One option, for example, is to develop a mechanism to support a limited number of students and ensure funding for those students for the period of the degree (with appropriate limits on time). Recent data from the Council of Graduate schools suggests GTAs, our major mechanism for funding students, increases the length of time in the program. We therefore need to find additional means of support for graduate students. This must be accomplished through grants, as University support is unlikely to be increased in the immediate future. If we have to limit support, how would those numbers be determined? How would they affect the ability of individual faculty to recruit high-quality students?

Two of our Master of Science in Biology concentrations, Biotechnology and Wetland Biology are in need of re-evaluation. This will involve discussion of the role of these concentrations in the program, and the curriculum needed for each. Are there alternative ways of teaching the courses required for these degrees; could some of the courses be offered on-line?
Graduate student recruitment:
In order to attract top quality students to our programs we need a strong and consistent recruiting process that covers everything from attracting students to apply to conducting on-campus interviews. It must also include mechanisms and criteria for acceptance. We must identify the additional resources necessary to implement such a process.

Student progress:
When students enter one of our programs they need to have a reasonable idea of how long they are going to be in the program and a realistic timetable for completion. We should not—and MUST NOT—drag out a student’s time in the program. We should be aiming to get our students out as quickly as possible without in any way compromising the quality of the degree.

Each program should develop a set of guidelines, with clear benchmarks, for a timetable for the student. During the first year this could include items such as completing a core set of courses, developing a super course, or perhaps an entrance exam spanning the basic knowledge expected. Results from such courses or exams would determine an appropriate program of study for the student, with emphasis on courses in which the student showed weakness. Second year students would start developing a project and become assimilated into their research program. Early in the third year students should be completing their comprehensive exam and having their research prospectus approved. In the fourth and fifth year students must be thinking about completing their research and their dissertations. We should set a goal of having our PhD students graduating within 5 years of admission. During their time in the program graduate students should be attending departmental seminars; faculty and must their students must participate in this program.

With benchmarks in place, we need to regularly measure our students’ progress to ensure that they are meeting those benchmarks. The Ecological Sciences PhD program and MS programs now have evaluation processes in place; the Biomedical Sciences program needs to develop such an evaluation process. Students need to be held accountable for their progress towards graduation; if they are not we need to determine why. If there are students who perhaps should not be in graduate school and need remediation or counseling towards other career choices they should be identified earlier rather than later. At the same time, we need to make sure that necessary courses are being taught frequently enough for students to complete their requirements.

Responsible Conduct of Research:
Governmental regulations require that those involved in research are taught the fundamentals of research integrity and ethics. We have therefore initiated a course, Responsible Conduct of Science (BIOL 672) that will be required of all incoming students admitted to Biology graduate programs.

Student funding for research and travel:
The Biology Graduate Student Organization (BGSO) is an active group that runs a variety of events throughout the academic year; and this group needs to be supported. If funds are available the department should support students who are presenting their research at
scientific meetings especially when the faculty member may be lacking travel funds. Also, in order to offset some of the costs to students whose advisor is between funding, small research grants are made available. These programs are administered by BGSO, in consultation with the department administration, with guidelines set up for the competitive allocation of funds that can be requested if departmental monies are available.

**Tracking graduate students post-graduation:**

We need to do a better job of tracking our students, especially our PhD students, after they graduate. A centralized database preferably within the university, but minimally within the department, under the guidance of the GPD, needs to be established that lists where our graduates are being placed, and where they are 5 years after graduation.

**Outreach and Distance Education.**

One way to increase our profile, at least in terms of teaching, is to take advantage of new technological innovations. With the current number of faculty we cannot always offer courses at times convenient to many of our students (this is especially true for evening, night, and weekend options). We should consider taking advantage of distance learning technologies to make courses available to students at times that are more convenient to them, realizing that this will not work for lab or field courses.

It has been suggested that we consider a non-thesis MS program that could be offered on-line or using some methods other than, or in addition to, face to face real time lecture. Such an approach may be appropriate for the MS in Biotechnology or a MS program for secondary science teachers. These options should be explored when resources are available.

We should also consider, as an outreach program, trying to develop relationships with schools in the area. Imagine the effect we could have if we were able to reach students at the K-12 level and turn them on to biology. Some of our faculty are in demand for their expertise and have developed successful programs with area high schools in which students come to campus and see what resources and opportunities are available here. By developing such a relationship, we can influence the way teachers and high school counselors look at ODU, and recruit more top quality students. But beyond that we can influence the public’s view of the department and ODU; think about the positive spin the kids would put on it when they go home and talk to their parents about the wonderful things we are doing at ODU after a visit from a faculty member or a visit to campus. Positive support in the community can be turned into positive support from those who provide the funding in Richmond. If we have the public’s support, state legislators are more likely to be supportive of the university initiatives. Funding from various agencies (NSF, Department of Education) should be sought for development and enhancement of these programs.
Ongoing Program Review and Assessment

The Biological Sciences comprise myriad dynamic, growing sub-disciplines whose future directions are often unpredictable and surprising as they unfold. We face the challenge of building and maintaining sound, current, and relevant programs in these disciplines at both the undergraduate and graduate levels, and doing so in the context of increasingly limited and often unpredictable resources. For this reason, we must develop appropriate and sound mechanisms for ongoing program review and assessment at both the undergraduate and graduate levels.

The University currently uses the WEAVE system for program assessment. This assessment vehicle provides a good framework for efforts within the department because it offers a systematic, straightforward process and requires that we conduct our assessments regularly. We have recently begun to use our undergraduate WEAVE assessment to strengthen internal assessment measures and to review and revise courses; this process must become institutionalized at the department level and should be expanded to include the graduate programs as well.

In addition to the program outcomes measured by the WEAVE process, we must also regularly review our overall program objectives and whether or not our existing curriculum – including both required and elective courses -- allows us to meet those objectives. We did this most recently in 2006 with excellent results; we should establish a timeline (every 5 years, for example) for conducting these reviews. Finally, we must regularly assess our standard 2-year rotation of individual course offerings to ensure that both our undergraduate and graduate students have access to the courses they need to meet their degree requirements and their program goals. Such a review must include identifying poorly-subscribed courses that should possibly be dropped and potential new courses that become necessary as our disciplines grow and change.

Other

Field vehicles: we need to consider appropriate replacement policies for our departmental vehicles and boats. Such equipment is essential to the ecological sciences, both for research and teaching (undergraduate and graduate field classes). Plans need to be developed for the replacement of vehicles as they age. Should we maintain our own fleet of vehicles or would resources be better spent with establishment of a college fleet of vehicles? To do this would require investment by the college in a person to manage the operations of the vehicles.

Core facilities: As the needs of the department grow we need to consider the role of core facilities. Currently we have facilities (microscopy and DNA sequencer) that are run by faculty; is this best way to run such facilities? To free up faculty time we should find ways of funding technician(s) that would be responsible for the operations and billing of the DNA sequencer, microscopy facilities (TEM, SEM, fluorescent scope and camera). Are there other facilities that we need to develop over the next ten years? In order to be able to do so we must look at the potential use and where to obtain the resources to run new operations.
These core facilities, like the animal facility, need to be able to recover costs from research grants. The microscopy and sequencing facility now have in place charge back protocols where use of these instruments is funded from some support mechanism. In addition we need to find an operational way of billing back for the use of departmental vehicles used for research. There are costs associated with traveling to a field site, just as there is for the use of animals or sequencing.

**BSSF:** One way of addressing the running of the facilities is to place them under the auspices of BSSF. In order to do that we need to take a look at the role BSSF plays in the department. The main function of BSSF is, and needs to remain, preparation of materials for classes. However, beyond that what is the best use of the technicians in BSSF? We also need to address the need for replacing the third technician – this position needs to be clearly identified for significant ecological science support duties, including use of vehicles and maintenance of the salt water system in the Physical Sciences Building (PSB). Where do we see the role of BSSF in 5 years from now and in 2020? Things will have changed, labs will have changed, and we need to be able to adapt to these changing environments. Retention of staff in the support facility needs to be monitored and reasons for leaving noted. One of the major contributors to staff leaving is the poor pay – we need to address this as well as providing them with opportunities for growth in their positions.

**Aquatic Facility:** With the opening of the PSB the department acquired control of a modern salt water aquatics and marine facility. This facility and the associated labs will allow for the further development of aquatic and marine research. In order to ensure the continuous smooth operation of this facility requires the presence of a full-time technician. This person needs to be available and on call in case of emergency situations that may occur due to mechanical or electrical failures.

**Herbarium:** The herbarium is used by faculty, staff, graduate and undergraduate students for research, teaching, specimen exchange, and scientific documentation supporting published manuscripts. Specimens provide the foundation of nomenclature, the basis for identification, the common reference for communication, and the vouchers for floras, as well as for evolutionary and genomic studies. The herbarium is a member of *Index Herbariorum*; the index lists entries of three faculty and staff, and details the over 60,000 plant collections. Funds to support the operations of the herbarium should be sought from granting agencies as university funds for such operations continue to decline.

**Blackwater Ecologic Preserve:** The department owned preserve is a 300 plus acre site that is part of the Zuni Pine Barrens State Natural Area managed currently by Prof Lytton Musselman. This area is used for a variety of research projects and a number of courses both at ODU and other institutions (Hampton University, Camp Community College, VPI) Over the next few years we need to address the management of the preserve and how to get the best out of it for our departmental needs. How do we select or determine who manages the preserve when the current manager retires or no longer wants the responsibility?
Off-campus field sites: One issue that needs to be considered for the development of some programs is formalization of alliances with appropriate field stations, including marine labs. Such alliances increase the opportunities for faculty and students to conduct field studies and participate in workshops and coursework. We already have faculty that regularly participate in programs at such sites run by other institutions.

We also need to develop a plan for opportunities that arise with regards to potential conservation easement areas/aquatic areas with features that benefit the education and research goals of the department and university. One pre-emptive approach to this type of plan is to define the type of habitat(s) that we would be interested in pursuing if an opportunity arises, rather than just seeing what becomes available at some time.

Endowments, Scholarships and Gifts: In addition to the two endowed chairs of Botany (Hogan and Stiffler), we have various scholarships (Marshall, Bagley, Savage) and two endowments that support seminar series (Sonenshine Infectious Diseases and Musselman Natural History). During the past few years we have substantially increased the amount of departmental endowments, scholarships and gifts. We must continue to do this, even with the current status of the economy.

Office: The office like other areas of the department is under staffed. We need to ensure that the staff in the office is being used appropriately. We need to look at the job descriptions of the office staff and determine how best to use these important members of the department. Are they being used appropriately? How can we enhance their career options?

The overview and development and strategic plan presented here is for the department as a whole, and not specific for individual programs. This departmental document was approved by majority vote of the tenure/tenure track faculty in January, 2010.

Attached to this document are (undergraduate education, ecological sciences) related white papers that provide an analysis of the respective programs. These individual documents were prepared by the participants listed within each document and do not necessarily reflect the opinion of the entire department.