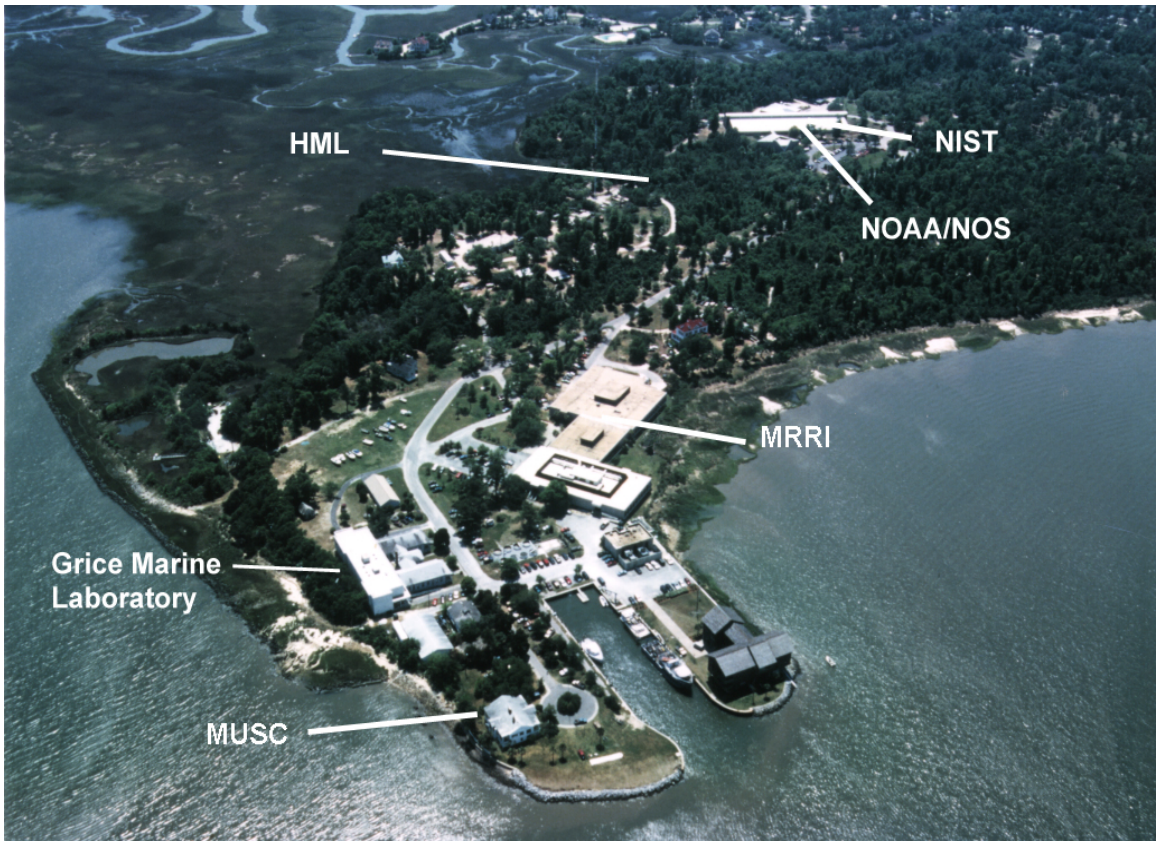
GRADUATE PROGRAM IN MARINE BIOLOGY



COLLEGE OF CHARLESTON

SELF-STUDY REPORT

SPRING 2014

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I. PROGRAM BACKGROUND, PURPOSE, GOALS AND OBJECTIVES

A. Background

The College of Charleston offers 19 master's degrees and 8 certificate graduate programs, one of which is a cooperative graduate program leading to a Masters of Science degree in Marine Biology that is now 40 years old. The Graduate Program in Marine Biology (GPMB) is administratively in the Department of Biology of the School of Sciences and Mathematics, and housed primarily at the College of Charleston Grice Marine Lab at the Fort Johnson Marine Science Center on James Island, six miles south of the main Charleston campus. With four major research facilities and 300+ scientists, the marine campus is one of the largest and most sophisticated marine research centers on the east coast.

The Master's Program in Marine Biology is one of the oldest graduate programs at the College of Charleston, having been first established in 1973 with the first graduates completing the program in 1976. The origins of the Marine Biology Graduate Program were modest with 7 students matriculated for the 1973/74 academic year. The program grew in student body size, faculty, student funding, and faculty extramural funding with enrollment of the Marine Biology Graduate Program reaching a plateau in 1990 of about 17 newly matriculated students per year. With a revamped curriculum in the mid 90s, increased national visibility, and a goal of funding all matriculated students through graduate assistantships, the program has reached a current enrollment of 50 to 55 students. The director of the program between August 1999 and December 2006 was Dr. David Owens while Dr. Craig Plante assumed the position of Director in January 2007.

Since 1955, the Grice Marine Laboratory (GML), which was originally "The Fort Johnson Marine Biological Laboratory" and later the "Grice Marine Biological Laboratory," has served as the core facility in support of the Graduate Program in Marine Biology (GPMB). Under the directorship of Dr. Robert Podolsky, the lab provides essential academic support for programs, courses and associated laboratories, laboratory advising, and research training for about 190 undergraduate majors and 55 graduate students. The laboratory provides office and research laboratory facilities and clerical, administrative and technical support for ten Department of Biology faculty who are integrally involved in the conduct and the administration of the GPMB. Laboratory and other facilities are provided by GML to both graduate and undergraduate students involved in marine research. The undergraduate major in Marine Biology is supported through courses taught at GML, through an NSF-REU sponsored undergraduate summer research program, and through College of Charleston undergraduate research projects. Graduate students in the GPMB provide essential academic support to the Department of Biology through Teaching Assistantship instruction in more than 57 sections of core freshman-level and limited upper division laboratory courses per semester.

B. Marine Genomics Initiative

In 2005 the College of Charleston partnered with the Medical University of South Carolina (MUSC) to receive a competitive grant from the state of South Carolina to hire two endowed chairs, one in Marine Bioinformatics (College of Charleston) and one in Marine Genomics (MUSC). The concept was to partner with MUSC and our other Fort Johnson collaborators where there was already considerable strength and interest in marine genomics. This new emphasis in marine genomics was added to our existing emphases in areas of fisheries, toxicology, ecology, biodiversity and physiology. It also complemented the relatively new College of Charleston undergraduate program in discovery informatics. After long searches, these chairs were filled by Drs. Gavin Naylor and Louis Guillette, at CofC and MUSC, resp. In addition, in 2006 we received $603,000 in direct funding from the state to enhance the marine genomics initiative. This funding included salaries and start-up funds for new faculty and staff positions, graduate student fellowships, as well as academic support for new courses. Two entry level marine genomics faculty members were hired (Drs. Christine Byrum and Andrew Shedlock) and the first two genomics fellowship students started their graduate programs in 2006. Since 2006, fifteen GPMB students have held the Marine Genomics fellowships. The Marine Genomics Fellowships have also become key recruiting tools for the GPMB. In the early years of the genomics initiative, few students knew about the emphasis or the fellowships. After several years of advertising, these fellowships have become much more recognized, as evidenced by the numerous emails and applications we get that specifically mention these fellowships. In 2013, these fellowship offers helped us to land two of our most coveted recruits, both with high GPA and composite (V+Q) GRE scores (3.58 and 315, 3.73 and 319) and extensive experience in molecular biology/genetics, and both interested in conducting their thesis research in an area of "genomics."

Because it took several years to fill these various faculty searches, the marine genomics curriculum is just now rounding into shape. Currently the following comprise the elective course offerings for the Marine Genomics fellows and other graduate students intersted in "omics" courses: Introduction to Genomics (taught by Byrum), Bioinformatics (Naylor), Vertebrate Genome Biology (Shedlock), and Marine Molecular Ecology (Sotka). In addition, the one-credit seminar courses, Conservation Genetics & Genomics (Shedlock) and Landmark Literature in Molecular Evolution (Naylor), are offered. To date, a few of these courses have suffered from low enrollment. Discussions among the GPMB director and the instructors of the above-mentioned courses about this issue are ongoing, but it appears that inclusion of more undergraduate students in these courses is likely (by crosslisting some of the courses, greater advertising in those already-crosslisted courses).

C. Cooperating Units

The GPMB, centered at the GML, is cooperative, and involves 114 faculty from more than 13 departments at regional academic and research institutions. GML faculty members work collaboratively with scientists at these institutions as well as with colleagues nationally and internationally. GML is an integral and equal player at the Fort Johnson Marine Science Center, where it works cooperatively with the NOAA Coastal

Center for Environmental Health and Marine Biomolecular Research (CCEHBR), The National Institutes of Standards and Technology (NIST), the Marine Resources Research Institute of the South Carolina Department of Natural Resources, and the Hollings Marine Laboratory.

As previously stated, the graduate program benefits from associations and shared resources with a number of other research institutions in South Carolina including:

1. The Citadel
2. The Marine Resources Research Institute (MRRI) of the South Carolina Division of Natural Resources (DNR)
3. The Waddel Mariculture Center of the South Carolina Division of Natural Resources (DNR)
4. The Medical University of South Carolina (MUSC) and its Marine Biomedicine and Environmental Science Program (MBES)
5. The Charleston laboratory of the NOAA Coastal Services Center
6. The Center for Coastal Environmental Health and Biomolecular Research (CCEHBR), part of NOAA's National Centers for Coastal Ocean Science (NOAA-NCCOS)
7. The Charleston laboratory of the National Institute of Standards and Technology (NIST)
8. The Hollings Marine Laboratory
9. Coastal Carolina University
10. Belle Baruch Marine Laboratory of the University of South Carolina
11. The South Carolina Aquarium

Approximately 80 select scientists at these institutions (known as adjunct faculty) serve actively as members of the Marine Biology Graduate Program faculty working closely with students in the classroom, laboratories, and in the field. These adjunct faculty members also provide funding support for stipends and research through their home institutions. These broad institutional associations enhance the Program's ability to offer academic breadth and training opportunities that could not be achieved with a single-institution program. Nearly all of these institutions are either located near to or have laboratories at the Fort Johnson Marine Science Center on James Island. Thus the students in the GPMB are in daily contact with individuals involved in virtually every aspect of research in coastal ocean and estuarine systems. The various research interests of the faculty and the resources provided by the cooperating institutions provide students with opportunities for research and training in such areas as aquaculture, fisheries management, ichthyology, invertebrate zoology, immunology, marine biomedical science, aquatic toxicology, marine biotechnology, genomics, marine ecology, marine environmental sciences, microbiology, cell biology, biological oceanography, physiological ecology, resource management and conservation biology, evolutionary biology, systematics, and biogeography.

D. Purpose

The ***purpose*** of the Graduate Program in Marine Biology is to offer students a well-rounded, Master's degree level of education in marine biology that will allow graduates to pursue further study or professional employment in marine science. The curriculum is designed to provide students with breadth in their education, while focused research projects develop depth.

E. Goals

The ***goals*** of the Graduate Program in Marine Biology are:

1. To recruit the highest possible caliber of students each calendar year.
2. To provide students financial, academic, curricular, and research resources in order to achieve successful and timely completion of the Graduate Program.
3. To prepare students as competitive candidates for PhD programs or vocational positions.
4. To sustain and nurture a broadly based faculty of top-quality research-oriented academicians.
5. To foster the strongest possible marine science training for the state of South Carolina.

In accord with the College of Charleston's initiatives on internationalization and student cultural diversity, our recruiting efforts and admissions screening seek to achieve, within the context of academic excellence, a balanced and diverse graduate population with a broad demographic and cultural profile.

F. Objectives

To achieve the purpose and goals of the Graduate Program in Marine Biology, the following objectives have been established.

1. Develop a recruiting strategy and national reputation that assures a steady stream of candidates that represent the best possible qualified pool of applicants each year.
2. Screen applicants carefully to assure that the highest academic standards are met by incoming students and that a diverse mix of demographic and cultural backgrounds is sustained.
3. Provide financial assistance to all incoming and matriculated students through a mix of Graduate Teaching Assistantships, Graduate Research Assistantships, grant/contract employment in areas specifically related to students' thesis research areas, and other financial and scholarship opportunities.
4. Provide students with access to information on a broad variety of research and training grants suitable to graduate students studying marine science.
5. Provide students with state-of-the-art library, computer, and network facilities.
6. Assure a broad range of resources to assist in research and training at the graduate level.

7. Provide a broad range of curricular offerings including core courses, electives, and seminars.
8. Maintain and nurture a faculty of nationally recognized, high caliber, PhD-trained, research-oriented faculty to advise and train students utilizing the College of Charleston roster faculty and appointments of adjunct faculty with expertise in appropriate areas.
9. Provide access to a broad variety of research laboratories in which students can seek training and undertake thesis research and that encourage interdisciplinary research and programming.
10. Maintain an active seminar program at the College of Charleston's main campus and on the Fort Johnson campus that students can avail themselves of, recruiting speakers from inside and outside the region and state.
11. Organize an annual student research colloquium that simulates a national meeting with invited keynote speakers.
12. Provide a modern campus atmosphere that encourages faculty-student camaraderie and an educational setting that nurtures scholarship, learning, and cooperation.

G. Fourth Century Inititative and the College's Strategic Plan

Following dozens of focus group discussions, a competitive analysis comparing the College to peer institutions, and a campus-wide SWOT analysis, the College released the first version of its new Strategic Plan in October, 2009 (oiep.cofc.edu/planning/strategic-plan.php). This plan identified the College's core values along with corresponding goals and strategies to acheive those goals. Most relevant to the GPMB is Goal 2: "Develop or enhance nationally recognized undergraduate, graduate and professional programs in areas that take advantage of our history, culture and location in Charleston and contribute to the well-being of the region." Strategy 2: "Develop nationally recognized academic programs at the graduate level" relates to this goal. Two specific initiatives within Strategy 2 are especailly relevant to the GPMB:

→ "Enhance graduate programs in marine science, environmental studies, historic preservation and arts management to achieve national recognition and – where possible – ranking by 2020."

→ "Collaborate with in-state university partners to develop and implement Ph.D. programs in marine biology, environmental studies and curriculum and instruction by 2020."

In subsequent discussions, marine biology has been identified as the logical first PhD program at the College of Charleston. This idea has to date received mixed support from the Biology Department and likewise from College faculty as a whole. The debate on this matter continues and the decision to formally pursue this new PhD program at the state level has yet to be made.

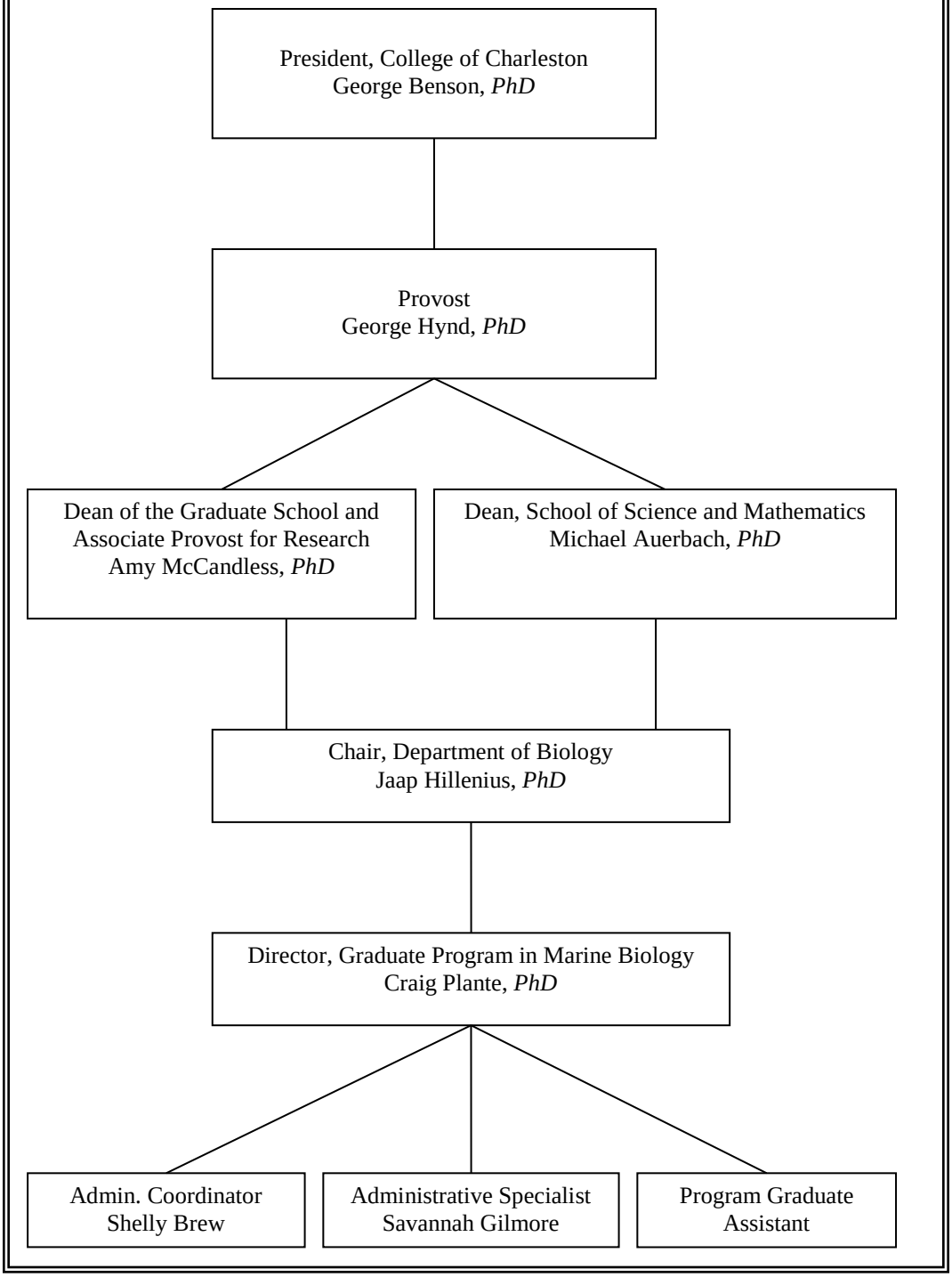
II. ORGANIZATIONAL INFORMATION

A. Organizational Structure

The Graduate Program in Marine Biology is organized under the "By-Laws, Graduate Program in Marine Biology" as seen in Appendix I. See also http://marinebiology.cofc.edu/faculty-resources/by-laws/index.php

In all matters pertaining to the Graduate Program, the graduate faculty is responsible to the Program Director, who reports to the Chair of the Department of Biology (College of Charleston). The Director of the GPMB is also responsible to the Associate Provost for Research and Dean of the Graduate School of the College of Charleston and the Dean of the School of Science and Math of the College of Charleston, both of whom report to the Provost, who in turn reports to the President of the College of Charleston (Chart II-1). The total graduate faculty is comprised of 36 roster faculty from the College of Charleston and 78 adjunct faculty from participating intuitions in the Lowcountry area (see Faculty Lists in Sec. IV).

Chart II-1 Organizational Chart



B. Budgetary Decisions

The Program Director works with the Dean of SSM, the Chair of Biology, and the Director of the GML to develop the annual GPMB budget. The operating budget has been approximately level for the past 10+ years with the exception noted in # 4 below from the new Marine Genomics initiative. The Graduate Program is supported from five principal budgetary sources.

1. The College of Charleston roster faculty and Graduate Teaching Assistants (22 @ nine months each) are paid through the regular teaching budget of the Department of Biology, established each year by the offices of Provost and the Dean of Math and Science. The allocation for teaching assistants has amounted to approximately $392,000 per year since 2009 (stipend = $16,000 for ½ time TA/academic year).
2. Programmatic expenses are provided by an annual budget directly to the program ($88,166 in 2013/2014). See Chart II-2 below. This budget includes a portion of the Director's salary and half of the Administrative Coordinator's salary with the other half of her salary covered by the Grice Marine Lab budget because she splits her time between the two programs. The operational budget has remained flat in recent years.
3. The third source of funding for the GPMB comes by way of Graduate Research Assistantships and other forms of grant/contract employment (approximately 20-25) provided through individual faculty in support of graduate students working on specific extramurally-funded research programs. This has amounted to approximately $160,000 per year for the past several years. One of the goals of the Graduate Program in Marine Biology is to provide financial support to all of our students requesting it during their tenure in the program, including summers. With rare exceptions this has been possible since 2004.
4. A fourth source of funding for the Program is the Marine Genomics state of South Carolina appropriation directly to the School of Science and Math, which is supporting genomics fellowships (see below) and a new full-time Administrative Specialist for the Graduate Program and GML. For 2013/2014 this direct funding amounts to an additional $115,500 for the year and is expected, but not assured at this time, to continue for the near future.
5. Finally the GPMB and College of Charleston have worked hard to increase discretionary stipend scholarships, which totaled $8,500 in 2000, and are now approximately $112,000 in 2013/2014. These are:

Joanna Deep Water Fund (since 1986, from an endowment of approximately $180,000), 2 @$3,000 – 4,000/yr

Presidential Recruiting Fellowships (since 2003, College of Charleston funding from Bookstore profits), 2 @$7,500/2 yrs

South Carolina Agriculture Society Scholarships (since 2005) a local philanthropic group, 1 @$3,000/year renewable

Marine Genomics Fellowships (since 2006)
4 @ $22,000 year for two years

Chart II-2 Graduate Program in Marine Biology Budget 2010-2013 (from Biology Department). This budget does not include the Teaching Assistantships, which have been about $392,000/year for the past three years.

Year	**2010/2011**	**2011/2012**	**2012/2013**	**2013/2014**
Ops Budget	18,382	18,382	18,382	18,382
Salary Budget	59,992	63,412	67,172	69,784
Total	78,374	81,794	85,554	88,166

Plus $88,000 for Marine Genomics Fellows and $27,500 for Admin Specialist salary = $115,500 total from Genomics add-on.

C. Curricular Decisions

The Curriculum and Academic Planning Committee typically initiates curriculum changes for the faculty to consider and the Marine Biology Council periodically evaluates the curriculum and program requirements, to ensure that the GPMB continues to reflect the needs of the students and the community, and that the curriculum is academically and scientifically sound. The Director of the Program serves as the Chair of the Marine Biology Council. In addition to the Director, this standing committee is composed of nine members: three from the College of Charleston and six at-large members from cooperating institutions. No more than two at-large members can come from the same institution.

D. Faculty Selection Decisions

All tenure-track and permanent instructor faculty of the Biology Department are considered regular members of the GPMB Graduate Faculty. In addition, the adjunct faculty members of the GPMB are appointed for three-year renewable appointments under the criteria specified below. Adjunct faculty members are drawn from other College of Charleston departments as well as a number of institutions in the Lowcountry. Selection criteria for adjunct faculty are established in the by-laws of the Graduate Program in Marine Biology (see Appendix 1). All regular members of the faculty have co-equality in teaching, advising, and governance roles as defined therein. Members of the graduate faculty share an avowed interest in graduate instruction through scholarly research, student advising, teaching of advanced subjects, and program development.

E. Nomination and Appointment of the Adjunct Graduate Faculty

All Adjunct Graduate Faculty must have:

1. An earned advanced degree in the candidate's field and appropriate to the Graduate Program in Marine Biology.

2. Evidence of productive scholarship. Such evidence may include two or more of the following:

    a. Recent publications of the results of original research in appropriately edited journals in which manuscript contents are critically evaluated through the process of peer review.

    b. Research grants support from extramural sources.

    c. Recognition of research competency by one's peers, such as serving on national review committees.

3. Active or planned participation in graduate education, such as teaching graduate courses, serving on graduate committees, and taking part in any other activities relevant to training of graduate students.

There are two categories of Adjunct Faculty membership: (a) **Regular Adjunct Faculty** possess an earned doctorate (or the equivalent), (b) **Associate Adjunct Faculty** possess a master's degree (or the equivalent). Any Regular Adjunct Faculty or College of Charleston faculty member may recommend candidates for consideration for appointment to the faculty. At the present time, the graduate faculty includes 64 Regular Adjunct Faculty and 14 Associate Adjunct Faculty (see Faculty List Sec. IV). Associate Adjunct Faculty have all the rights of Regular Adjunct Faculty members, except the right to nominate new faculty members and to serve as major advisors to graduate students.

The Marine Biology Council reviews the credentials of all proposed adjunct appointments to the graduate faculty. Following study by the Council, appointees' names must be brought before the entire GPMB faculty for their evaluation. Based on their vote, the Marine Biology Council will make a recommendation to the entire faculty with respect to whether each appointment should be made. If a candidate is approved for appointment by the faculty, his or her name will be sent by the Director of the Program for approval by the Dean of the Graduate School of the College of Charleston.

Adjunct appointments to the faculty are made by the President of the College of Charleston upon recommendation by the Dean of Graduate Studies of College of Charleston. Appointments are for three years. Adjunct appointees to the graduate faculty must indicate their acceptance, in writing, to the President. If an adjunct faculty member's employment ceases at the institution from which he or she was appointed, the faculty appointment ends. Any reappointment shall follow the Graduate School procedure for initial appointment.

F. Reappointment of Adjunct Faculty

Adjunct faculty having completed a term appointment may be reappointed by demonstrating, during his or her previous term, active participation in aspects of graduate education, such as: continued productive scholarship, the teaching of graduate level courses, chairing or serving on graduate students' oral examination committees, and active participation in the business of graduate faculty. Reappointment to the faculty shall follow the same procedure and criteria as for appointment to the faculty. Appointment, continuation of appointment, and reappointment of associate adjunct faculty will follow the same procedures as for regular adjunct faculty. Appointments will be for a term of three years.

G. Graduate Program Committees

The following is the full list of committees that provide input into the decision-making processes for the GPMB.

Marine Biology Council

A. The Director of the Program serves as the Chair of the Marine Biology Council. In addition to the Director, this standing committee is composed of nine members, including three from the College of Charleston and six at-large members. No more than two at-large members can come from the same institution.

B. The Director cannot serve as a representative of College of Charleston. He or she will vote only in case of a tie. The Director shall chair all meetings, schedule meetings, notify all representatives, and must convene a meeting when one-third of the Council petitions in writing for a special session.

C. Members of the Council (excluding the Director) will serve three-year terms and may succeed themselves once in this appointment. Members are elected for staggered terms (1/3 each year).

D. The Council is responsible for reviewing the Program, including core curricula and all other courses for inclusion in the Program as recommended by the Curriculum and Academic Planning Committee. Recommendations of the Council regarding the curriculum must be submitted for action to the faculty and to the Dean of the Graduate School of the College of Charleston and then to the Faculty Senate.

E. The Council will periodically review and evaluate as appropriate the curriculum and requirements so that the Program reflects the needs of the students and the community and is academically and scientifically sound. Changes recommended by the Council are subject to approval by the Faculty. Such recommendations shall be submitted to the Dean of the Graduate School of the College of Charleston for his or her approval.

F. The Marine Biology Council is also concerned with formulating long-range goals related to marine biology graduate education, including reviewing the establishment of mechanisms both to accomplish these goals and to monitor their success.

G. The Marine Biology Council functions as the steering body of the marine biology graduate program and serves the interests of the program and the individual students. The Council has primary responsibility for monitoring the progress of each graduate student in the program until the student has chosen a thesis advisor and committee. The Council hears and makes recommendations upon appeals from graduate students regarding changes in status, extension of time limits, satisfaction of requirements, transfer of credits, and other similar matters. Their recommendations will become final unless appealed in accordance with appropriate student procedures at College of Charleston.

Admissions Committee

The purpose of the Admissions Committee is to review and make recommendations concerning admission procedure and policies. In addition, this committee reviews applications for admission and makes decisions concerning admissions. The Admissions Committee consists of eight faculty members: two from the College of Charleston and six at-large members.

Curriculum and Academic Planning Committee

The purpose of the Curriculum and Academic Planning Committee is to make recommendations to the Marine Biology Council concerning all courses, programs and changes in the graduate curriculum. The Curriculum and Academic Planning Committee consists of eight faculty members: two from the College of Charleston and six at-large members.

Funding and Cooperative Research Committee

The purpose of the Funding and Cooperative Research Committee is to investigate sources of funding to ensure continued progress toward research and academic goals, and to encourage interdisciplinary and inter-institutional research initiatives and programs. It attempts to expedite cooperative sharing of facilities, personnel, and equipment among the Graduate Program's participating institutions and faculty. The Funding and Cooperative Research Committee consists of four faculty members: one from the College of Charleston and three at-large members.

Faculty-Student Relations Committee

The Faculty-Student Relations Committee is responsible for orientation and introduction of all new students to facilities and the faculty. It is responsible for development and operation of a continuing scholarly seminar series, preparation and annual updating of a graduate student handbook, and regularly interfacing with the graduate student body. The

Faculty-Student Relations Committee consists of four faculty members: one from the College of Charleston and three at-large members.

Colloquium Committee

The purpose of the Colloquium Committee is to organize the annual graduate student oriented GPMB research colloquium as a formal scientific meeting. They will also organize the recruitment of an annual invited keynote speaker.

III. SUPPORTING/COOPERATIVE UNITS

A. Grice Marine Laboratory (College of Charleston)

The chief supporting unit and administrative parent of the **Grice Marine Laboratory (GML)** is the Department of Biology in the College's School of Math and Science. GML is, in turn, the principal support unit of the Graduate Program in Marine Biology. The Grice Lab was founded by the College of Charleston in 1955 as The Fort Johnson Marine Biological Laboratory. GML and its accompanying facilities occupy a portion of the former Quarantine Station for the Port of Charleston, located on a 90-acre peninsula near the entrance to Charleston Harbor. GML currently houses the offices and research laboratories of 8 College of Charleston roster faculty, plus one emeritus, 2 post-graduate researchers, and many of our 50+ graduate students. Facilities include offices and laboratories, research/reference collections (fish and invertebrate), a Molecular Core Faciltiy (incl. DNA sequencing), a wet lab, lounge/conference room, teaching labs, classrooms, dormitories, workshop, warehouse facilities, and a small fleet of boats. Dormitories at Grice Lab can house up to 5 graduate students or visiting researchers in single rooms.

The zoological collections at GML date from the 1960's and have been compiled from a broad variety of local, state and federally funded research projects. The collection houses 5000+ invertebrate lots and 42,000+ fish lots. Most notably, two world-class ichthyologists stationed at GML, Drs. Antony S. Harold (collection curator) and William D. Anderson, Jr., have made a concerted effort to build a representative collection of fishes from the South Atlantic Bight (Cape Lookout, North Carolina to Cape Canaveral, Florida). Considerable ichthyological material has come from the SCDNR-MRRI federally-funded MARMAP Program. The SCDNR-MRRI MARMAP larval fish collection (30,000+ lots) was accessioned in 1994, bringing the total fish collection holdings to more than 42,000 lots with 400,000+ specimens, representing about 225 families and 1300 species. About 6,300 lots of fishes have been cataloged in a relational database through funding from NOAA Fisheries, through a subcontract with SCDNR (SERTC Project), with the aim of making specimens and information about them more accessible for teaching and research. These funds have supported undergraduate and graduate students and faculty collection-based activities. In addition to serving as critical material in a variety of undergraduate and graduate courses (e.g., Ichthyology,

Invertebrate Zoology, Marine Biology, Coral Reef Biology), the collections are also a valuable research resource for undergraduate and graduate students, GML faculty, and visiting scientists and investigators from other institutions. The collection also makes its material available for research through loans to investigators at other institutions in the United States and other countries (see http://gricemarinelab.cofc.edu/)

i. New Grice Building

In June of 2006 the legislature of the State of South Carolina provided $4,000,000 in funding for a new building at the Grice facility. Plans are being developed for approximately 20,571 sq. ft. of new space that will replace our former garage/shop and include two large teaching laboratories, a large classroom, meeting rooms, dining area, graduate student and post-doc offices, 5 faculty offices, 5 faculty laboratories, a boat bay, and a new storage/shop area. Construction is slated to begin soon after the initiation of the Rita Hollings Science Center renovation in 2014.

ii. The Fort Johnson Environment

Surrounding the GML grounds is a rich estuarine ecosystem containing oyster reefs, sand bars, and extensive *Spartina* marshes. The open ocean and the beaches of the coastal barrier islands are just two miles away. The exposed rock jetties on each side of the Charleston Harbor provide a rocky habitat that is rarely seen in the South Atlantic Bight. GML is approximately 5 miles from downtown Charleston and the main campus of the College of Charleston.

iii. Dixie Plantation

This valuable teaching and research resource is owned by the College of Charleston Foundation. It comprises 881 acres with access via the Stono River to the Intracoastal Waterway, and is located about 20 miles south of the main campus. The Plantation encompasses a number of relatively undisturbed ecosystems (24 years since the last large hurricane) including upland pine forest, savannahs, non-forested wetlands consisting of three small ponds (freshwater, saltwater and brackish) and a tidal salt marsh, and forested wetlands. The property also houses potentially significant historical and cultural resources. There is instrumentation on site to monitor the hydrology, biogeochemistry and ecological condition of parts of the Plantation. Development of Dixie, including new teaching facilities, is guided by a conservation easement through the Lowcountry Open Land Trust (LOLT). A master plan for the Plantation is now in the middle stages of implementation. Two field stations for student and faculty teaching and research will be constructed in 2014. In addition, native ecosystems are being restored, an interpretive trail has been completed, an original barn has been reconstructed to be used as a multi-use (teaching, education, and entertaining) venue, and an heirloom garden is being restored.

B. Libraries

i. The Marine Resources Library (MRL)

Opened in 1972, MRL serves the research staff of the Marine Resources Division of the South Carolina Wildlife and Marine Resources Department (now the South Carolina Department of Natural Resources) located at the Fort Johnson Marine Science Center. In 1977, the Marine Resources Division merged its library holdings with those of the College of Charleston's Grice Marine Biological Laboratory, which was also located at Fort Johnson. In August 1996, the library holdings of NOAA Fisheries/Charleston Laboratory, located at Fort Johnson, were merged into the Marine Resources Library. The Marine Resources Library is supported financially by the College of Charleston, the South Carolina Department of Natural Resources Marine Resources Division, and the NOAA Charleston Laboratory.

The library's collection now includes 25,400 monographic titles, 9,800 bound periodicals, 450 journal subscriptions, and 42,000 reprints. The collection's strengths include marine biology, marine ecology, fisheries science, ichthyology, invertebrate zoology, toxicology, marine forensics, biotechnology, ecotoxicology, phycology, and biochemistry. The library provides resources and services to the staff, faculty, and students of the three supporting institutions. A major renovation of the library providing high-density shelving that will accommodate collection growth through 2032 has just been completed.
http://www.mrl.cofc.edu/

ii. The Marlene and Nathan Addlestone Library

The Marlene and Nathan Addlestone Library opened to students on the first day of spring semester, January 17, 2005. The building is three stories high and 145,000 sq ft approximately the size of three football fields stacked on top of each other and includes a set-aside quiet room specifically for graduate students. The Addlestone library provides seating for 1,400 patrons at tables, carrels, lounge chairs, 16 study rooms, 4 meeting rooms, and two teaching labs. Students enjoy access to 260 computers, 1,700 data ports and wireless access throughout the building as well as the wood paneled exhibit spaces for rare books such as Audubon's *Birds of America*. The building also houses a café and the Center for Student Learning. The building was designed for a bimodal -print and electronic- environment. The library continues to acquire and store printed materials, exponentially increasing the amount of electronic information available from the catalog and databases. Current book capacity is 1 million volumes on both traditional and mobile shelving. With addition of supplementary movable book stacks, the library can triple the size of its collection. Ubiquitous access to electronic information is essential from both within and outside the library and continues to grow in importance. Wireless access is available throughout in the building and from the Rivers Green. There are 260 computers for students use in the building – including laptops with which they can move throughout the building. In addition, there are hundreds of data ports where they may use their own laptops. The Henry Brown wing is named in honor of the state senator whose efforts led to acquire the state funding for the property.
http://www.cofc.edu/library/

iii. The Medical University of South Carolina Library

The Medical University of South Carolina Library acquires and maintains resources in biomedical, marine biomedical/biochemical, and general health sciences. In addition to its regular holdings, it maintains rare book, historical, and archival collections. The MUSC Library has a total of more than 56,000 physical volumes, 169,000 paper books and ebooks, and 20,600 active e-journal titles. Access is available through MUSC Library System, a collection of online resources that provide access to the library's database, a gateway to the AIDS databases, PDQ cancer treatment information, and local library collections and databases. The collections covered by MUSCLS include the resources located in the MUSC Library and its learning Center, the Waring Historical Library, MUSC's Biometry Library, the Environmental Hazard Assessment Program collections, and several other Lowcountry health-related collections of the South Carolina Health Information Network Libraries.
http://www.library.musc.edu/

C. Cooperating Institutions

As previously noted, the College of Charleston's Graduate Program in Marine Biology maintains cooperative agreements with several other research institutions in the Lowcountry. These cooperating institutions provide both faculty and facilities to the Program and are thus valuable and integral components of the GPMB. College of Charleston students and faculty are actively engaged in cooperative research programs with colleagues in these laboratories. A brief description of these cooperating institutions is provided below.

i. The Marine Resources Research Institute (MRRI) Division of Natural Resources, SouthCarolina

Provides the scientific expertise and facilities to support the Marine Division's resource management and educational programs. The MRRI facility includes office and research space that was historically set aside for College of Charleston use. Currently one emeritus faculty (Charles Biernbaum) and one main campus faculty member (Isaure De Buron) occupy small but very useful research labs in this facility. In addition, the SC-DNR maintains three excellent graduate student office complexes (18 carrels) that our students occupy. MRRI scientists work closely with the Office of Fisheries Management (OFM) to conduct research and monitoring programs to assess the condition of coastal resources and provide data required to address policy and management issues related to those resources. Major research areas include: Monitoring and assessing the condition of all major fishery species, including estuarine and offshore finfish stocks, shellfish, shrimp and crab populations; monitoring the condition of other important biological resources and their associated habitats, environmental studies to assess the effects of human activities on coastal resources; and mariculture research designed to develop improved technologies for producing seafood and enhancing depleted fishery stocks.

Much of the restoration and mariculture research is conducted at the James M. Waddell Mariculture Center (WMC) located in Bluffton, SC. The MRRI also serves as the administrative base for the **ACE Basin National Estuarine Research Reserve** located south of Charleston in one of the largest unspoiled riverine/estuarine/coastal reserves in the U.S. MRRI scientists participate in educational programs at these institutions as adjunct faculty, providing guidance and financial support for graduate and undergraduate students.
http://www.dnr.sc.gov/marine/mrri/mrri.htm

ii. The Hollings Marine Laboratory (HML).
Named after Senator E. Fritz Hollings, former Chairman of the Senate Commerce Committee, this laboratory is a multi-institutional, multi-disciplinary institution providing science and biotechnology applications to sustain, protect, and restore coastal ecosystems, emphasizing linkages between environmental and human health. HML consists of approximately 103,000 square feet of state-of-the-art laboratory/bench space for analytical/environmental chemistry, aquaculture, scanning and transmission electron microscopes, cryogenic sample preparation and long-term storage, and two BSL3 laboratories. Owned and operated by the National Center for Coastal and Ocean Sciences (NCCOS), it is governed by an Executive Board, a Science Board, and several operational committees, under the leadership of a NOAA laboratory director. Staff consists of about 130 scientists from each of the five partner institutions, visiting scientists, and about 20-30 graduate students, all conducting collaborative research in the HML thematic areas: Environmental/Analytical Chemistry; Environmental Biology/Response Evaluation, Molecular Biology (including Genomics) and Physiology and Aquatic Production. The College of Charleston is a major player in this "new approach" to collaborative research with five College of Charleston faculty (Jack DiTullio, Gavin Naylor, Andrew Shedlock, and Lou and Karen Burnett) occupying major research labs at HML. These are in fact their primary research labs and they have approximately 16 scientists and graduate students working at HML at any time.
http://www.hml.noaa.gov/

iii. The Citadel
A state-supported comprehensive military college. Since 1986, males and females have been admitted to the undergraduate residential Corps of Cadets. In addition to the day program, undergraduate and graduate programs are offered through the College of Graduate and Professional Studies (CGPS) in the evening. These include an MS degree in Biology Education.
http://www.citadel.edu/

iv. The Center for Coastal Environmental Health and Biomolecular Research (CCEHBR)
The Center conducts interdisciplinary research to resolve issues related to coastal ecosystem health, environmental quality, and related public health impacts. Chemical, biomolecular, microbiological, and histological methods are used in both laboratory and field studies to describe, evaluate, and predict the controlling factors and outcomes of natural and anthropogenic influences in marine and estuarine habitats.

http://www.chbr.noaa.gov/

v. Marine Biomedical and Environmental Science Program, MUSC

Marine Biomedicine and Environmental Sciences (MBES) is an academic center of the Medical University of South Carolina providing a multidisciplinary program of graduate education and basic research. Its mission is to investigate the reciprocal relationships of organisms and their marine environment using modern molecular, biochemical, and cell biological techniques. Emphasis is placed on aspects of human health and disease. The Program exists as a sub-discipline within the MUSC interdepartmental program in molecular and cellular biology and pathobiology. The goal of the MBES curriculum is to combine a solid background in molecular and cellular biology with flexible, individually tailored exposure to the marine biosciences, equipping students for future leadership roles in environmental health-related sciences.
http://www.musc.edu/mbes/home.htm

vi. The James M. Waddell Mariculture Research and Development Center

The James M. Waddell Research and Development Center is one of the country's largest and most sophisticated facilities for mariculture research. It was constructed in 1983-84 to develop propagation and farming techniques for marine and brackish water species of finfish, mollusks, crustaceans and plants. The Center's large physical plant allows researchers to extend to a commercial scale promising laboratory work.
http://www.dnr.sc.gov/marine/mrri/waddell/

vii. The South Carolina Aquarium

Since opening in 2000 as the State of South Carolina non-profit aquarium/teaching facility, the aquarium has won several awards for the quality of its exhibits and educational programs. The aquarium's current veterinarian is a GPMB adjunct faculty member and the aquarium staff collaborates with several faculty and students of the GPMB and other College of Charleston marine scientists and educators.
In addition, excellent employment opportunities have been developed for our GPMB graduates.
http://www.scaquarium.org/

IV. FACULTY LISTINGS

A. Faculty list with links to web profiles and email addresses

William D. Anderson Jr. (Emeritus) Ph.D., 1960, Univ. of South Carolina. Systematics of fishes and history of natural biology. andersonwd@Cofc.edu

Michael D. Arendt M.S., 1999, College of William & Mary. arendtm@dnr.sc.gov

Stephen A. Arnott Ph.D., University of Glasgow. Fisheries ecology, life history evolution, parasite ecology, climate change. arnotts@dnr.sc.gov

Agnes J. Ayme-Southgate Ph.D., University of Geneva - Geneva, Switzerland.Genomics and molecular analysis of insect muscle proteins, protein structure-function relationship and biophysical modeling, significance for understanding muscle physiology, development, insect flight and evolution.. southgatea@Cofc.edu

John E. Baatz Ph.D., 1988, University of Cincinnati. Mammalian lung biochemistry and molecular biology. baatzje@musc.edu

Joseph C. Ballenger Ph.D., 2011, Old Dominion University. Fish life history and population dynamics, fish biology/ecology, fisheries science/management. ballengerj@dnr.sc.gov

Paul R. Becker Ph.D., 1972, Texas A&M University. Fate and effects of environmental contaminants, development and application of environmental specimen banking for retrospective monitoring and research.paul.becker@noaa.gov

Shane Boylan D.V.M., 2005, North Carolina State College of Veterinary Medicine. Sea turtle health and rehabilitation medicine, fish and invertebrate medicine and husbandry. sboylan@scaquarium.org

Karl Brenkert M.S., 2000, Florida Institute of Technology. brenkertk@dnr.sc.gov

Craig L. Browdy Ph.D., 1989, Tel Aviv University. Aquaculture, fish and shrimp health and nutrition, aquaculture sustainability and development of new production technologies to improve sustainable healthy seafood production, alternatives to marine products and new nutritional strategies for improvement of aqua feeds, disease management and enhancement of host immunity. Craig.browdy@novusint.com

Erin J. Burge Ph.D., 2003, College of William and Mary, Virginia. Molecular immunology of fishes and invertebrates, host-pathogen interactions, environmental influences on immunity, molecular ecology. eburge@coastal.edu

Karen G. Burnett Ph.D., 1978, University of South Carolina. Environmental and comparative immunology.burnettk@Cofc.edu

Louis E. Burnett, Jr. Ph.D., 1977, University of South Carolina. Comparative physiology, immunology, disease mechanisms in marine animals.burnettl@Cofc.edu

Christine A. Byrum Ph.D., 2001, University of Texas, Austin. Evolution and development of endoderm and mesoderm in marine invertebrates, cell specification and signal transduction, cnidarian gastrulation, use of the sea urchin as a developmental model at the cellular, molecular, and systems level, evolution of the metazoan body plan. byrumc@cofc.edu

Robert W. Chapman Ph.D., 1980, University of Georgia. Population genetics, molecular systematics, invertebrate immunology. chapmanr@dnr.sc.gov

Steven J. Christopher Ph.D., 1998, Clemson University. Development and application of high accuracy analytical methodologies for the determination of trace element contaminants in marine biological matrices. steven.christopher@noaa.gov

Katy W. Chung M.S., 1999, University of Charleston. Aquatic toxicology. Katy.chung@noaa.gov

Andrew J. Clark Ph.D., 2009, University of California, Irvine. Comparative biomechanics, form and function of musculoskeletal systems, biomechanics of hagfish feeding, evolution of prey capture mechanisms, mechanics of biological materials. clarkaj@cofc.edu

Loren D. Coen Ph.D., 1987, University of Maryland, College Park. Marine ecology, benthic ecology, shellfish biology. lcoen1@fau.edu

Mark R. Collins Ph.D., 1984, University of Florida.Life history of marine and diadromous fishes, fish migration patterns and habitat use, restoration of depleted fish populations.. collinsm@dnr.sc.gov

Stacie E. Crowe M.S., 2001, Nova Southeastern University. Benthic ecology, taxonomy of marine invertebrates. crowes@dnr.sc.gov

Jaclyn Daly M.S., University of Queensland, Australia. Estuarine and marine resource management, regulatory and policy. Jaclyn.daly@noaa.gov

Tanya L. Darden Ph.D., 2004, University of Southern Mississippi. Ecology and evolution of fishes, ichthyology, population genetics, fisheries science. dardent@dnr.sc.gov

Margaret A. Davidson M.M.A., 1980, University of Rhode Island. Coastal resource management and research. Margaret.Davidson@noaa.gov

Russell D. Day Ph.D., 2012, University of PauMercury toxicology in sea turtles and seabirds russell.day@noaa.gov

Isaure de Buron Ph.D., 1986,Universite des Sciences et Techniques, Montpellier,France. Parasites of brackish and marine water fishes: biology, life history, and histopathology.deburoni@Cofc.edu

Marie E. DeLorenzo Ph.D., 1997, Clemson University. Environmental toxicology. marie.delorenzo@noaa.gov

Michael R. Denson Ph.D., 2006, Clemson University. Fisheries management, aquaculture, stock enhancement. densonm@dnr.sc.gov

M. Richard DeVoe M.M.A., 1980, University of Rhode Island. Aquaculture policy, marine/coastal policy and management, regional ocean policy and management, coastal land use policy, science management, science communication. rick.devoe@scseagrant.org

Robert T. Dillon, Jr. Ph.D., 1982, Pennsylvania. The ecology, evolution, and genetics of mollusks. dillonr@Cofc.edu

Giacomo R. DiTullio Ph.D., 1987, University of Hawaii. Phytoplankton physiology and ecology. ditullioj@Cofc.edu

Gregory J. Doucette PhD., 1989, University of British Columbia. Marine biotoxins and the ecophysiology of harmful algae. greg.doucette@noaa.gov

Phillip Dustan Ph.D., 1975, State Uinversity New York at Stony Brook. Genecology of reef-building corals.dustanp@Cofc.edu

Peter J. Etnoyer Ph.D., 2009, Texas A&M University, Corpus Christi. Deep-sea coral diversity and ecology, Geographic Information Systems (GIS) for marine conservation and management. Peter.etnoyer@noaa.gov

Patricia A. Fair Ph.D., 1992, Clemson University. Effects of environmental contaminants, emerging diseases and stressors on the health of marine mammals.pat.fair@noaa.gov

Wayne R. Fitzgibbon Ph.D., 1985, University of Newcastle, Shortland, N.S.W, Australia. Applying microphysiological techniques to the study of hormonal regulation of mammalian renal physiology and pathophysiology. fitzgiwr@musc.edu

Michael H. Fulton Ph.D., 1989, University of South Carolina. Environmental toxicology. mike.fulton@noaa.gov

Sylvia B. Galloway Ph.D., 1974, Medical University of South Carolina. Native fluorescent proteins as natural reporters of coral health, molecular indicators of coral disease in relationship to environmental and anthropogenic stressors utilizing genomic/proteomic approach, coral antimicrobial activities. Sylvia.galloway@noaa.gov

Dianne I. Greenfield Ph.D., 2002, Stony Brook University. Ecolgy and physiology of coastal phytoplankton. dgreenfield@belle.baruch.sc.edu

Thomas W. Greig Ph.D., 2000, University of South Carolina. Fisheries population genetics, molecular marine forensics, evolutionary ecotoxicology. Thomas.Greig@noaa.gov

Louis J. Guillette, Jr. Ph.D., 1981, University of Colorado. Vertebrate reproductive biology with an emphasis on developmental genetics and endocrine physiology, environmental health of wildlife and human populations with an emphasis on ecotoxicology and endocrine disrupting contaminants (EDCs). guillett@musc.edu

Danny J. Gustafson Ph.D., 2000, Southern Illinois University. Plant ecology, conservation genetics, mechanisms structuring populations and communities, spatial genetic structure of the endangered pondberry (*Lindera melissifolia*), genetic control of community assembly rules, laurel wilt disease.. danny.gustafson@citadel.edu

Nancy H. Hadley M.S., 1981, College of Charleston. Oyster reef ecology, restoration, and conservation. hadleyn@dnr.sc.gov

Antony S. Harold Ph.D., 1991, Memorial University of Newfoundland. Phylogenetic systematics and biogeography of marine and freshwater fishes. harolda@Cofc.edu

Willem J. Hillenius Ph.D., 1992, Oregon State University.Vertebrate evolutionary morphology and paleobiology. . hilleniusw@Cofc.edu

Melissa Hughes Ph.D., 1994, Duke University. Animal behavior, behavioral ecology, function and evolution of animal signalshughesm@Cofc.edu

Jeffrey L. Hyland Ph.D., 1981, University of Rhode Island. Marine benthic ecology, ecotoxicology, animal-sediment-pollutant interactions, integrative assessments of coastal ecosystem health, linking ecosystem change to human disturbance, deep-sea coral ecology and stressor impacts.. jeff.hyland@noaa.gov

Michael G. Janech Ph.D., 2003, Medical University of South Carolina. Using proteomics as a tool for biomarker discovery and to study regulatory pathways in marine organisms. janechmg@musc.edu

Pamela C. Jutte Ph.D., 1997, University of California at Berkeley. Benthic ecology, marine invertebrate behavioral ecology, environmental assessment. juttep@yahoo.com

Jennifer M. Keller Ph.D., 2003, Duke University. Effects of organic environmental contaminants on marine wildlife health. jennifer.keller@noaa.gov

Peter B. Key Ph.D. 1995, University of South Carolina. Environmental toxicology. pete.key@noaa.gov

Peter R. Kingsley-Smith Ph.D., 2002, University College of North Wales, Bangor, UK. Ecology of oyster reef-associated finfish and invertebrate assemblages, shellfish resource assessments for sustainable management and directed restoration efforts, bivalve aquaculture, background in molluscan ecology, invertebrate zoology, optimal foraging theory, predator-prey community dynamics and larval ecology. kingsleysmithp@dnr.sc.gov

David M. Knott M.S., 1980, College of Charleston.Taxonomy and ecology of benthic and planktonic invertebrates from coastal and continental shelf habitats in the southeastern US, invasive and non-indigenous species. david.knott@why-knott.com

Satomi Kohno Ph.D., 2003, Yokohama City University, Yokohama, Japan. Developmental and reproductive endocrinology in vertebrates, and environmental influences on it. kohno@musc.edu

Christopher A. Korey Ph.D., 2001, Harvard University. *Drosophila* genetics; Molecular genetics of Human neurological disease using *Drosophila* as a model system. koreyc@Cofc.edu

John R. Kucklick Ph.D., 1992, University of South Carolina. Environmental and marine chemistry, analytical chemistry, bioaccumulation of pollutants in marine food webs, identifying and measuring chemicals of emerging concern, marine organisms as indicators of pollution . john.kucklick@noaa.gov

Eric R. Lacy Ph.D., 1979, State University New York at Buffalo. Stingray osmoregulation and reproduction. lacyer@musc.edu

Mark D. Lazzaro Ph.D., 1992, Univ. California, Riverside. Cell biology:; structure and function of plant cells lazzarom@Cofc.edu

Peter A. Lee Ph.D., 2000, Universite du Quebec a Rimouski, Canada. Sulfur biogeochemistry, climate change impacts on marine phytoplankton, algal community structure and biogenic sulfur production, application of flow cytometry and "-omics" technologies to phytoplankton ecophysiology and sulfur biogeochemistry. leep@cofc.edu

John W. Leffler Ph.D., 1977, University of Georgia. Sustainable mariculture, commercialization of biofloc-based, minimal exchange, superintensive shrimp aquaculture systems, reduction or elimination of fishmeal and fish oil from fish and shrimp feeds, benefit-risk analyses (chemical contaminants vs. beneficial fatty acids) of seafood consumption by humans. LefflerJ@dnr.sc.gov

Erin M. Levesque M.S., 2000, College of Charleston. levesquee@dnr.sc.gov

Susan Lovelace Ph.D., 2008, Eastern Carolina University. Interdisciplinary considerations of the linkages between coastal environmental health and ecosystem services and human health and human wellbeing, community environmental decision-making, roles of local government, science experts and environmental action groups, including group and individual knowledge, attitudes and beliefs, skills in research and education program development, needs assessment and evaluation. Susan.lovelace@noaa.gov

Philip P. Maier M.S., 1992, College of Charleston. Natural resource inventory, recreational use of public lands, habitat restoration, invasive species. maierp@dnr.sc.gov

Lisa May M.S., 1985, Austin Peay State University. Microbial ecology and coral-microbe interactions, DNA damage and its effect upon the reproductive potential of coral, effects of stressors on coral health. Lisa.may@noaa.gov

Eric J. McElroy Ph.D., 2008, Ohio University. Evolution and ecology of animal performance and functional morphology; functional, physiological, and morphological basis of animal behavior. mcelroye@cofc.edu

Wayne E. McFee M.S., 1990, Northeastern University. Marine mammal strandings, marine mammal life history, dolphin/human interactions. Wayne.Mcfee@noaa.gov

Elizabeth Meyer-Bernstein Ph.D., 1998, State University New York at Stony Brook. Circadian rhythms. meyerbernsteine@Cofc.edu

Susan J. Morrison Ph.D., 1980, Florida State University. Ecology of estuarine and marine microbes. morrisons@Cofc.edu

Courtney Murren Ph.D. 1999, University of Connecticut. Plant Ecological Genetics: factors contributing to invasive species establishment success, pollination ecology in forest fragments, phenotypic plasticity, and phenotypic evolution. murrenc@Cofc.edu

Gavin Naylor Ph.D., 1989, University of Maryland. Molecular evolution, phylogenetics and comparative anatomy of chondrichthyan fishes (sharks, skates, and rays), population genetics, bioinformatics, origin of novelty. naylorg@cofc.edu

Julie A. Neer Ph.D., 2005, Louisiana State University. Fisheries science and management, elasmobranch ecology, life history of fishes, population dynamics. Julie.neer@safmc.net

Paul M. Nolan Ph.D., 2002, Auburn University. Behavioral ecology, disease ecology, ornithology, avian habitat selection. Paul.nolan@citadel.edu

David Wm. Owens Ph.D., 1976, University of Arizona. Chelonian reproductive and conservation biology, endocrine physiology and physiological ecology. owensd@Cofc.edu

Margie M. Peden-Adams Ph.D., 1999,Environmental Toxicology, Clemson University. Sub-lethal toxicological effects of environmental contaminants. pedenadams@gmail.com

Paul L. Pennington Ph.D., 2002, University of South Carolina, Environmental Health Sciences.Non-point source pollution in aquatic systems, coastal land use and population growth, monitoring of emerging contaminants in aquatic systems, the development, refinement, and usage of laboratory bioassays, microcosms, mesocosms and flow-through systems for aquatic toxicology.. paul.pennington@noaa.gov

John S. Peters Ph.D., 2006, University of Northern Colorado. Age and growth of fishes. petersj@Cofc.edu

Craig J. Plante Ph.D., 1992, University of Washington. Microbial ecology, benthic biology, of animal-microbe interactions, bioremediation, and the role of autoinduction in the development of marine biofilms and the production of antimicrobials in marine bacteria. plantec@Cofc.edu

Robert D. Podolsky Ph.D., 1995, University of Washington. Functional biology and evolutionary ecology of marine invertebrates, larval ecology and life-history evolution, fertilization ecology, physiological ecology, phenotypic plasticity. podolskyr@Cofc.edu

Lou Ann Reed Ph.D., 1999, Medical University of South Carolina. Environmental chemistry, ecotoxicology. Louann.reed@noaa.gov

Marcel J.M. Reichert Ph.D., 2002, University of Groningen. Fish ecology, fisheries science, fish life history studies, life bottom habitats, estuarine ecology. reichertm@dnr.sc.gov

William A. Roumillat M.S., 1992, Old Dominion University. Biology of fishes, histologically verified fish reproductive ecology, fish behavioral ecology. roumillatb@dnr.sc.gov

Matthew T. Rutter Ph.D., 2002, Duke University. Plant ecology, genetics and evolution. rutterm@cofc.edu

Gorka Sancho Ph.D.,1998, Woods Hole Oceanographic Institution / Massachusetts Institute of Technology. Behavioral ecology of fishes, fisheries conservation. sanchog@Cofc.edu

Paul A. Sandifer Ph.D., 1972, University of Virginia, Biology of decapod Crustacea, aquaculture, coastal ecology. paul.sandifer@noaa.gov

Denise M. Sanger Ph.D., 1998, University of South Carolina. Impacts of coastal development on estuarine environments, stormwater runoff, estuarine ecology and ecotoxicology.. sangerd@dnr.sc.gov

Leslie R. Sautter Ph.D., 1990, University of South Carolina. Seasonal particulate flux – open ocean, mostly planktonic Foraminifera.sautterl@Cofc.edu

Brian G. Scholtens Ph.D., 1990, University of Michigan. Insect ecology and conservation. scholtensb@Cofc.edu

Lori H. Schwacke Ph.D., 1999, Medical University of South Carolina. Sentinel marine species as indicators of human health risks, epidemiology applied to protected species, population models for risk assessment. lori.schwacke@noaa.gov

Geoffrey I. Scott Ph.D., 1979,University of South Carolina. Aquatic toxicology. geoff.scott@noaa.gov

George R. Sedberry Ph.D., 1980, College of William and Mary. Marine fish ecology and fisheries, conservation and natural resource management, deep-sea biology. George.sedberry@noaa.gov

Andrew M. Shedlock Ph.D., 1997, University of Washington. Comparative evolutionary genomics; impacts of mobile DNA and non-coding RNA on eukaryotic genome structure and transcriptome function, computational biology, phylogeny, ecology and population genetics of marine vertebrates. shedlockam@cofc.edu

Virginia R. Shervette Ph.D., 2006, Texas A&M University. Estuarine ecology and management, conservation biology, fish ecology, oyster reef ecology, urbanization of estuaries, Human Dimensions of fisheries management, tropical ecology. shervette@usc.edu

Tracey Smart Ph.D., 2008, University of Oregon. Life history ecology, reproductive ecology, biological oceanography, fisheries science. SmartT@dnr.sc.gov

Erik E.Sotka PhD., 2001, University of North Carolina at Chapel Hill. Ecology and evolution of marine biotic interactions, larval dispersal, molecular ecology, chemical ecology. sotkae@Cofc.edu

Allan E. Strand Ph.D., 1997, New Mexico State University. Plant evolutionary biology, population genetics, demography and conservation. stranda@Cofc.edu

Anna Toline Ph.D., 1994, University of Toronto. Catherine_toline@nps.gov

Jeffrey D. Triblehorn Ph.D., University of Maryland, College Park. Sensory neurobiology and the neural control of behavior primarily involving invertebrate systems

and includes studies using neurophysiological, neuroanatomical, and behavioral techniques. triblehornj@cofc.edu

Frances M. Van Dolah Ph.D., 1992, Medical University of South Carolina. Functional genomics of toxic dinoflagellates; effects of algal toxins on marine mammals and human consumers. fran.vandolah@noaa.gov

Robert F. Van Dolah Ph.D., 1978, University of Maryland. Benthic ecology, toxicology, environmental assessment, vandolahr@dnr.sc.gov

Jason T. Vance Ph.D., 2009, University of Nevada, Las Vegas. Biomechanics, aerodynamics, and control of insect flight, ontogeny of maximal flight performance and foraging behavior in honey bees. vancejt@cofc.edu

Keith Walters Ph.D., 1987, University of South Florida. Marine ecology, habitat restoration, marine snow dynamics, plant-animal interactions, meiofauna, oyster reefs. kwalt@coastal.edu

John E. Weinstein Ph.D., 1994, University of South Carolina. Environmental toxicology; john.weinstein@citadel.edu

Allison M. Welch Ph.D., 2000, University of Missouri, Columbia. Evolutionary biology and behavioral ecology: evolution of sexual displays and mating preferences; quantitative and ecological genetics, context-dependent sexual selection. welcha@cofc.edu

J. David Whitaker M.S., 1978, Marine Biology, Collegeof College. Crustacean fisheries resource research. whitakerd@dnr.sc.gov

Dara H. Wilber Ph.D., 1987, Florida State University. Marine ecology, habitat restoration, environmental impact assessment. wilberdh@aol.com

Pace Wilber Ph.D., 1988, Florida State University. Benthic ecology, Geographical information systems, environmental management. pace.wilber@noaa.gov

Edward F. Wirth Ph.D., 1999, University of South Carolina (Public Health) Environmental toxicology. Ed.Wirth@noaa.gov

D. Reid Wiseman Ph.D., 1974, Duke University. Systematics and ecology of marine algae. wisemand@Cofc.edu

Cheryl M. Woodley Ph.D., 1984, Medical University of South Carolina. The application of biomedical concepts and technologies with coral health.cheryl.woodley@noaa.gov

David M. Wyanski M.A., 1990, College of William and Mary. Life history and taxonomy of marine fishes, fisheries biology. wyanskid@dnr.sc.gov

John D. Zardus Ph.D., 1998, Northeastern University. Marine invertebrate zoology, benthic ecology, larval biology, population genetics, biology of commensal barnacles
john.zardus@citadel.edu

Anastasia M. Zimmerman Ph.D., 2003, Washington State University. Molecular evolution of the vertebrate immune system, genome-wide analyses of innate and adaptive immune loci in fishes, use of the zebrafish as an immunological model.
zimmermana@Cofc.edu

B. Faculty Breakdown by Institution

i. Roster Faculty - College of Charleston

Agnes Ayme-Southgate - Associate Professor
Karen Burnett – Research Associate
Louis E. Burnett – Professor
Christine Byrum - Assistant Professor
Andrew Clark - Assistant Professor
Isaure de Buron - Professor
Robert T. Dillon, Jr. - Associate Professor
Giacomo (Jack) DiTullio - Professor**,** John Arthur Siegling Endowed Chair in Biology
Phillip Dustan – Professor
Renaud Geslain – Assistant Professor
Antony (Tony) S. Harold - Professor
William (Jaap) Hillenius - Professor, Biology Department Chair
Melissa Hughes – Associate Professor
Christopher Korey - Associate Professor
Mark Lazzaro - Associate Professor
Peter Lee – Research Associate
Eric McElroy – Assistant Professor
Elizabeth Meyer-Bernstein - Associate Professor
Susan Morrison - Assistant Professor
Courtney Murren - Associate Professor

Gavin Naylor - Professor
David W. Owens - Professor, Associate Provost of the Graduate School
John S. Peters - Senior Instructor
Craig J. Plante - Professor, Director of the Graduate Program in Marine Biology
Robert D. Podolsky – Associate Professor, Director of the Grice Marine Laboratory
Seth Pritchard - Associate Professor
Matthew Rutter – Associate Professor
Gorka Sancho – Associate Professor
Leslie Sautter – Associate Professor
Brian Scholtens - Professor
Andrew Shedlock – Assistant Professor
Erik Sotka - Associate Professor
Allan Strand - Professor
Jeffrey Triblehorn – Assistant Professor
Jason Vance – Assistant Professor
Allison Welch – Assistant Professor
D. Reid Wiseman - Associate Professor
Anastasia Zimmerman – Associate Professor

ii. Emeritus Faculty

William D. Anderson, Jr. - Professor Emeritus
Charles K. Biernbaum - Professor Emeritus
James W. Smiley - Professor Emeritus
Martha W. Runey - Associate Professor Emeritus

iii. Adjunct Faculty – The Citadel

Danny J. Gustafson	Paul Nolan
John E. Weinstein	John D. Zardus

iv. Adjunct Faculty – South Carolina Department of Natural Resources

Michael D. Arendt	Stephen A. Arnott
Joseph C. Ballenger	Karl Brenkert
Robert Chapman	Mark R. Collins
Stacie E. Crowe	Tanya L. Darden
Michael R. Denson	Dianne I. Greenfield
Nancy H. Hadley	Peter R. Kingsley-Smith
David Knott	John W. Leffler
Erin M. Levesque	Philip P. Maier
Marcel J.M. Reichert	William A. Roumillat
Denise M. Sanger	Tracey Smart
Robert F. Van Dolah	J. David Whitaker
David M. Wyanski	

v. Adjunct Faculty – MUSC

John E. Baatz	Wayne R. Fitzgibbon
Louis J. Guillette, Jr.	Michael G. Janech
Satomi Kohno	Eric R. Lacy

vi. Adjunct Faculty - NOAA

Katy W. Chung	Jaclyn Daly
Margaret A. Davidson	Marie E. DeLorenzo
Gregory J. Doucette	Peter J. Etnoyer
Patricia A. Fair	Michael H. Fulton
Sylvia B. Galloway	Thomas W. Greig
Jeffrey L. Hyland	Peter B. Key
Susan Lovelace	Lisa May
Wayne E. McFee	Paul L. Pennington
Lou Ann Reed	Paul A. Sandifer
Lori H. Schwacke	Geoffrey I. Scott

George Sedberry	Frances M. Van Dolah
Pace Wilber	Edward F. Wirth
Cheryl M. Woodley	

vii. Adjunct Faculty – NIST

Paul R. Becker	Steven J. Christopher
Russell D. Day	Jennifer M. Keller
John R. Kucklick	

viii. Adjunct Faculty – Other

Shane Boylan (South Carolina Aquarium)	Erin J. Burge (Coastal Carolina University)
Loren D. Coen (Florida Atlantic University)	M. Richard DeVoe (Sea Grant)
Pamela C. Jutte	Julie A. Neer (SEDAR Coordinator)
Margie Peden-Adams (UNLV)	Virginia Shervette (USC-Aiken)
Anna Toline (National Park Service)	Keith Walters (Coastal Carolina University)
Dara H. Wilber (Bowhead Science and Technology)	Craig Browdy (Novus International)

C. RECENT (since 2006/2007) GPMB FACULTY PUBLICATIONS

William D. Anderson Jr.

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Michael D. Arendt

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V. STUDENTS

A. Current Admission Criteria

1. A completed application form with a nonrefundable application fee ($50 for on-line application, $75 for paper application). Deadlines: February 1 for fall admission, November 1 for spring admission.
2. A personal statement/statement of goals.
3. One official transcript from each institution of higher learning attended.
4. An official copy of scores from the general test of the Graduate Record Examination. (Biology subject test is optional)
5. Three letters of recommendation from persons closely associated with previous work related to the discipline.
6. Evidence of background in the sciences:
   a. A bachelor's degree.
   b. Twenty semester hours of upper division biological courses, including a course in cellular or molecular biology (or the equivalent) and a course in ecology (or the equivalent).
   c. Chemistry - two courses in organic or one course in analytical (beyond first year chemistry).
   d. General Physics - two courses.
   e. Calculus - one course.
   f. Students with otherwise outstanding academic preparation who may lack one of the required courses may be admitted as provisional students.
7. A résumé
8. International students must show evidence of a command of spoken and written English (TOEFL score).

B. Official Summary of GPMB Student Profiles

Chart V-1

Degree Seeking Student Information							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Declared Majors*	60	53	53	45	45	48	50
Part-time	37	38	39	28	32	33	32
Full-time	23	15	14	17	13	15	18
Average Age	25.1	25.4	25.6	25.1	25.0	25.1	25.3
Gender Distribution							
Male	22	22	23	19	12	10	10
Female	38	31	30	26	33	38	40
Racial Distribution (new federal race mapping starting Fall 2010)							
African American	0	0	0	0	0	0	0
White	54	48	51	43	42	43	44
Asian	1	0	0	0	2	3	3
American Indian	0	0	0	0	0	0	0
Hispanic	2	1	0	1	1	2	2
Pac. Is., Alaskan	1	1	1	0	0	0	0
Non Resident Alien				0	0	0	0
2 or More				0	0	0	0
Unknown	2	3	1	1	0	0	1

Tuition Residency							
SC	43	38	45	37	40	45	46
Non-Resident	17	15	8	8	5	3	4
Geographic Origin							
SC	5	9	8	4	5	10	8
Non-SC	55	44	45	41	40	38	42
Missing	0						

Standardized Test Scores of All Majors							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
GRE (OLD)							
Analytical							
Writing Assessment	4.1	4.2	4.5	3.3	2.5	1.7	1.4
Verbal	535	561	521	556	554	557	556
Quantitative	662	666	657	678	680	682	676
GRE (NEW)							
Analytical/ Writing							
Verbal						155	158
Quantitative						155	156
MAT							
GMAT							
BMIO GRE				693	691	687	725

Graduate Information							
	06-07	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**	**12-13**

Graduates by Academic Year							
	18	16	14	18	11	8	14
Avg. Length of Years to Graduation							
	3.86	3.50	3.61	3.39	3.82	3.81	3.32

Course Information							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Course Enrollment	168	143	128	132	137	137	136
Courses Offered**	12.5	15.2	11.2	11	14.5	13	12.5

CHE Annual Service Enrollment							
	07-08	**08-09**	**09-10**	**10-11**	**11-12**	**12-13**	**5-Year Average**
Student Credit Hours	563	449	499	474	492	494	482
Divisor	24	24	24	24	24	24	24
Service Enrollment***	23.5	18.7	20.8	19.8	20.5	20.6	20.1
Course FTE	46.9	37.4	41.6	39.5	41.0	41.2	40.1

Applications ****							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Accepted	24	21	21	21	17	28	27
Not Accepted	46	17	28	65	97	84	94
No Decision	0	0	1	0	0	0	0
Total Applications	70	38	50	86	114	112	121
Residents	6	3	2	5	3	7	6
Non-Residents	64	35	48	81	111	105	115

Enrolled	15	11	15	16	14	14	16

Average Undergraduate GPA							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Accepted	3.45	3.52	3.49	3.61	3.71	3.69	3.74
Not Accepted	3.28	3.06	3.30	3.27	3.32	3.24	3.35
No Decision			3.71				

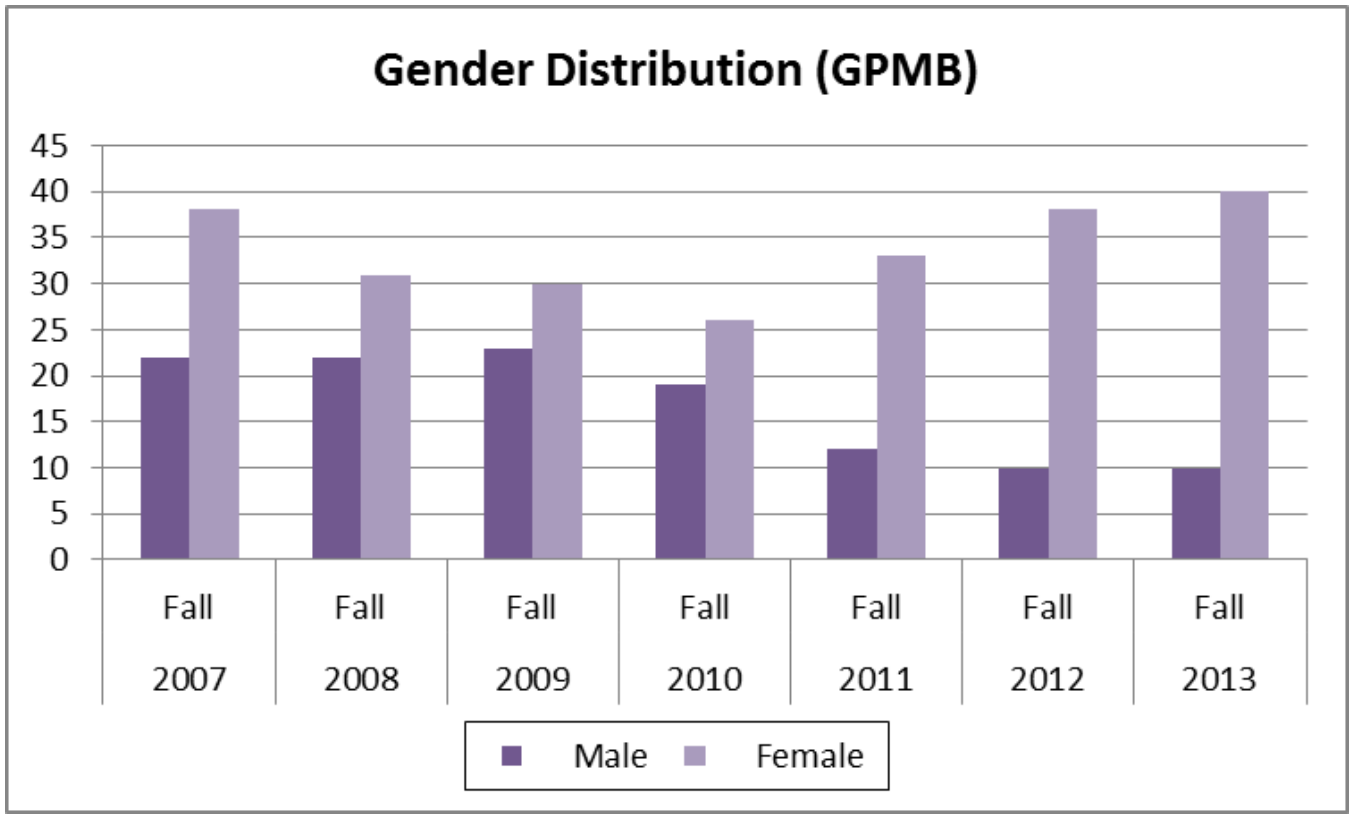
Undergraduate Institution							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Accepted – SC	3	3	4	1	1	2	2
Accepted - Non-SC	20	17	17	18	16	25	25
Missing	1	1	0	2	0	1	0

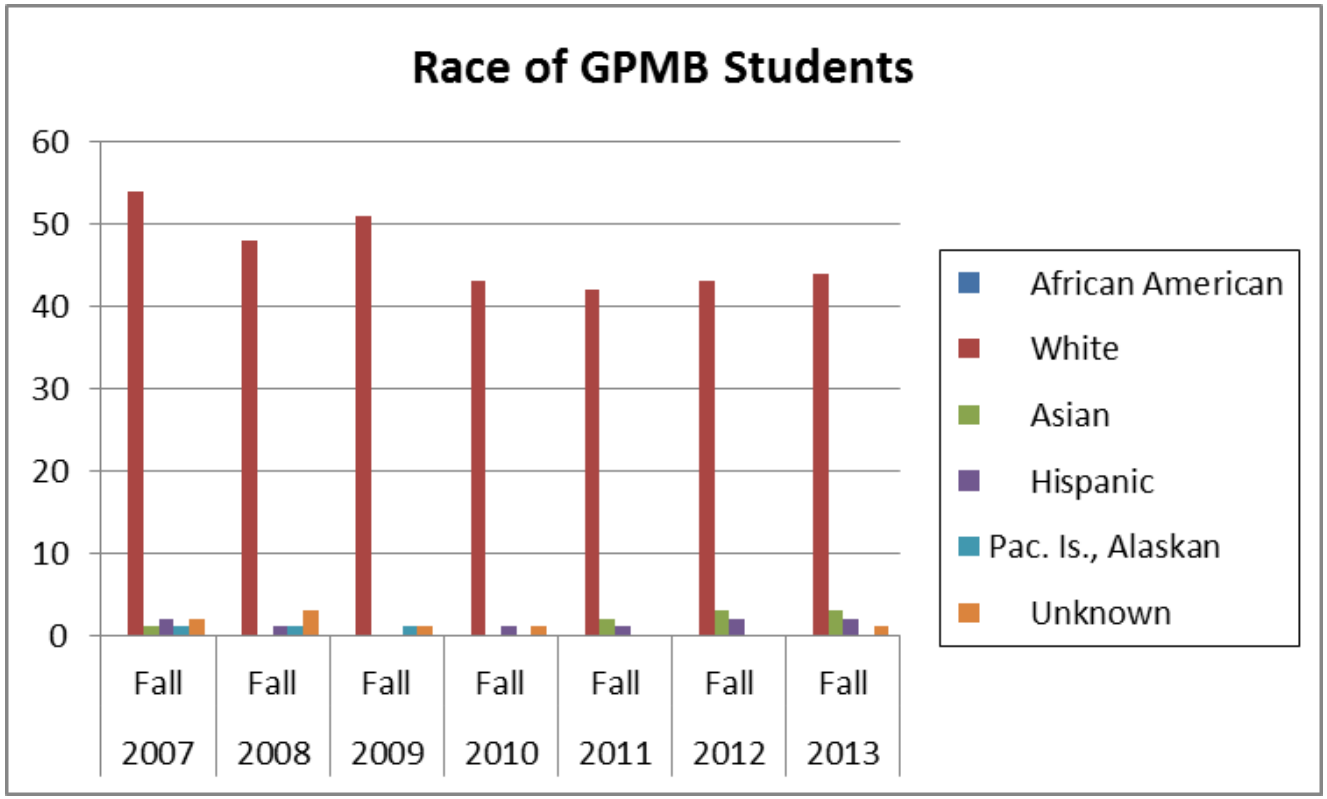
Cumulative GPA of Enrolled Students							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Average GPA	3.79	3.6	3.62	3.6	3.68	3.81	3.73

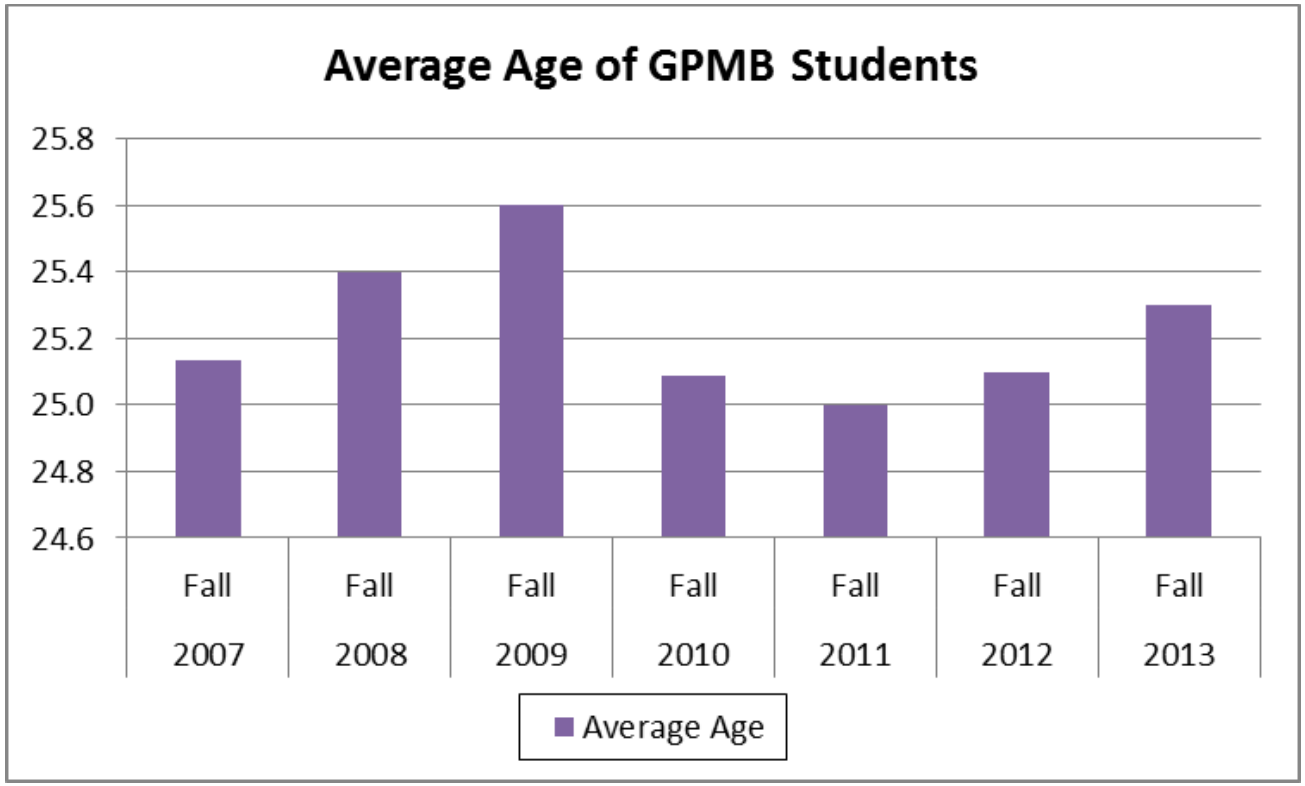
Notes:
** Headcount includes double majors.*
*** Number of courses offered excludes independent studies and consortium courses.*
**** Service Enrollment calculated on past 5 years' data only, where available.*
***** Starting Fall 2011, includes summer applications.*

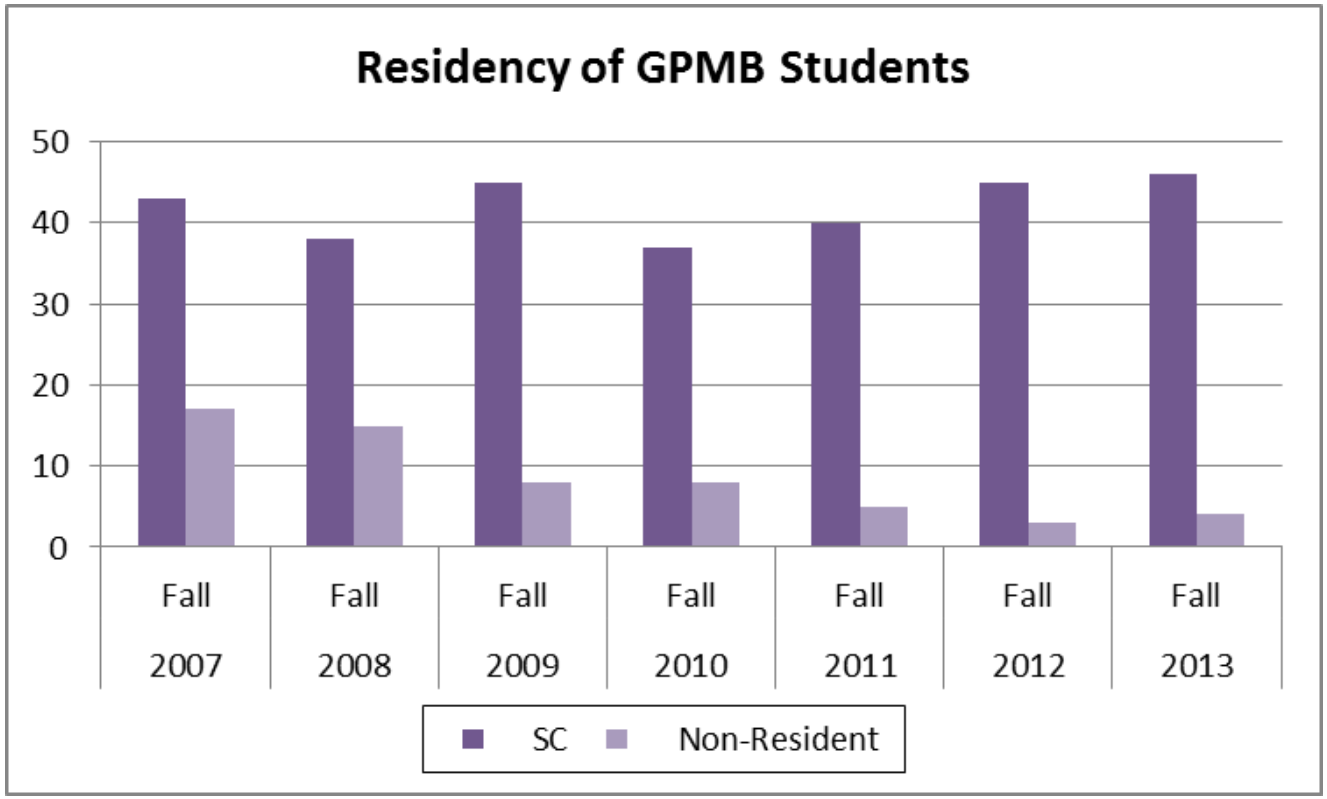
C. Student Profiles Graphs

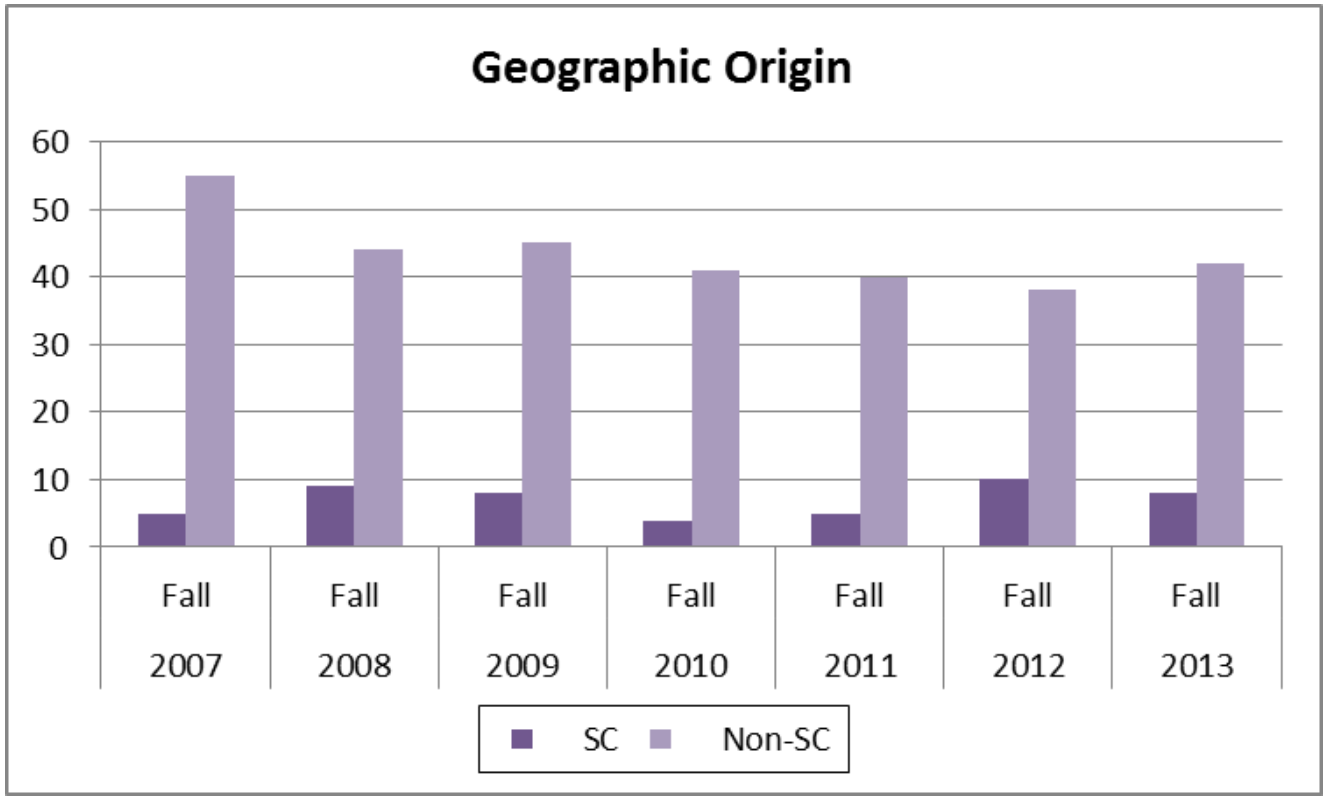
Charts V-2 through V-8 below describe the demographics of the students in GPMB.

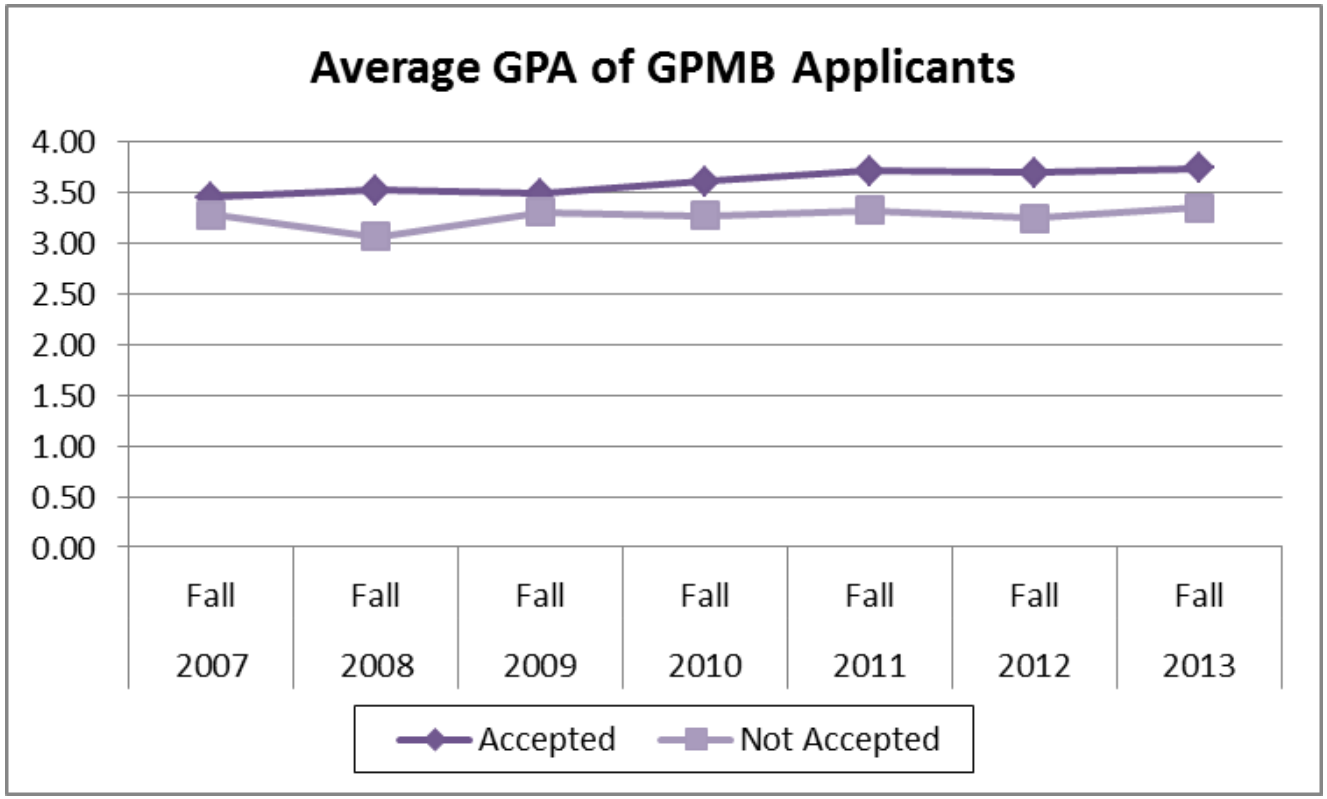


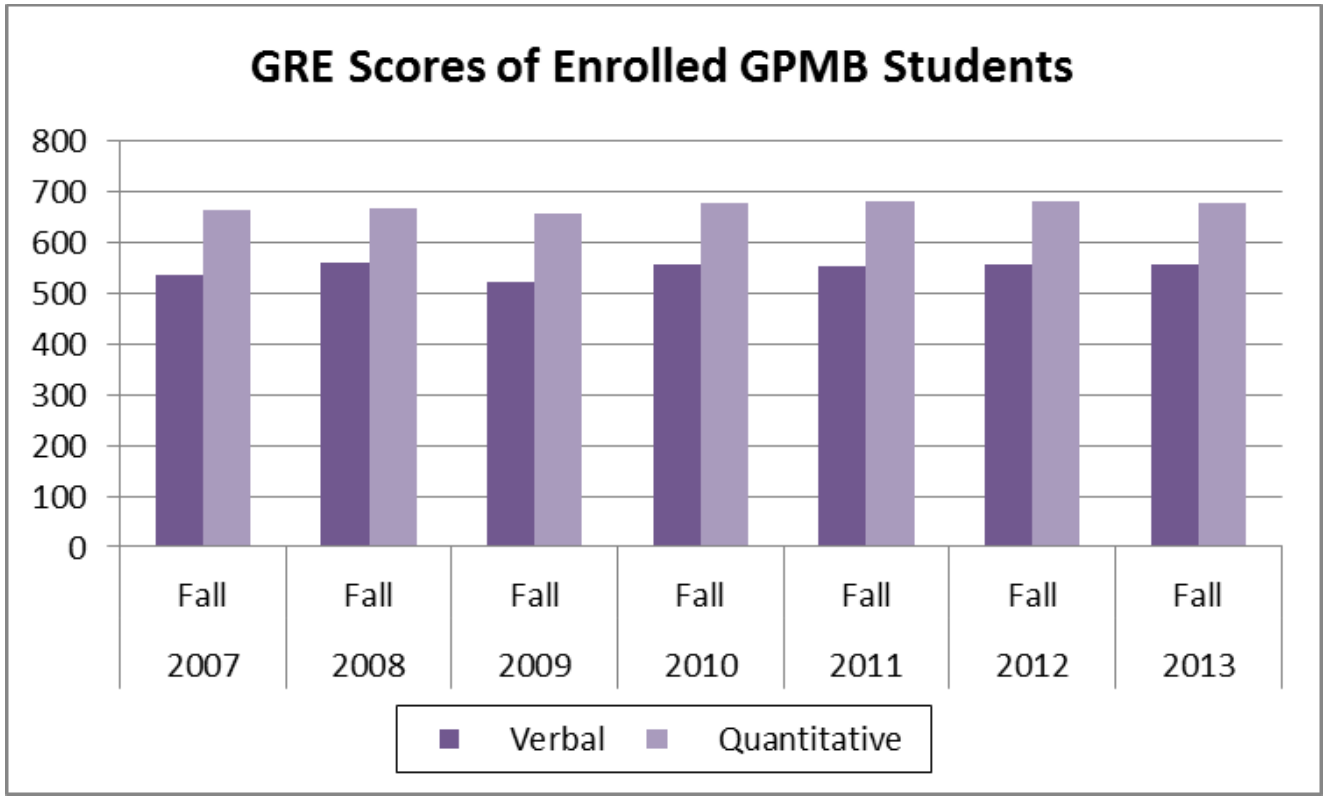

Race of GPMB Students
60
50
40
30
20
10
0
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
African American
White
Asian
Hispanic
Pac. Is., Alaskan
Unknown


Average Age of GPMB Students
25.8
25.6
25.4
25.2
25.0
24.8
24.6
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Average Age


Residency of GPMB Students
50
40
30
20
10
0
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
SC
Non-Resident


Geographic Origin
60
50
40
30
20
10
0
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
SC
Non-SC


Average GPA of GPMB Applicants
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Accepted
Not Accepted


GRE Scores of Enrolled GPMB Students
800
700
600
500
400
300
200
100
0
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Verbal
Quantitative

D. Current GPMB Students

i. Student recruitment

The GPMB invests a significant amount of time to the recruiting of graduate students. Several approaches are taken, including the purchase of an advertisement in the annual publication *Petersons Guide to Graduate Schools* under the Marine Biology heading (cost is about $2,100/year). This publication is distributed to all major colleges and universities and many international institutions. The Peterson's services also include an on-line component that can be found at www.Petersons.com Peterson's also provides a monthly accounting of the number of web contacts and links to our website. In addition, each year we prepare a new GPMB poster with tear-off contact information. With the help of our graduate students these are mailed to 1000 to 1500 undergraduate biology programs in the US. Of course, students can also access our web site, as well as our Facebook (www.facebook.com/GPMBCofC) and joint GPMB-GML Twitter (twitter.com/GriceMarineLab) pages. We have also been fortunate to have many faculty and former students who send us prospective students to consider our program. When a promising prospective student contacts us it has also been our policy to invite the student to visit the Grice Marine Lab and the College of Charleston. A visit to our campus usually has very positive results. After a dip in application numbers following the year (2007) when the directorship transitioned from Owens to Plante, application numbers climbed to reach historic highs over the last few recruiting seasons. Corresponding with this increase, applicant pool quality (as reflected by undergraduate GPA and GRE) appears to have improved slightly (see Charts V-7 and V-8 above). Charts V-9 and V-10 summarize all GPMB applicants for Fall 2007-2013 at the College of Charleston. Chart V-9 reveals that our yield (enrolled/accepted) for those applicants offered admission has ranged between 50 and 82% within the 2007-2013 period. Chart V-11 compares GPMB applicants to those of other Masters programs at the College of Charleston for 2013.

Chart V-9

Applications							
	Fall 2007	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
Accepted	24	21	21	21	17	28	27
Not Accepted	46	17	28	65	97	84	94
No Decision	0	0	1	0	0	0	0
Total Applications	70	38	50	86	114	112	121
Residents	6	3	2	5	3	7	6
Non-Residents	64	35	48	81	111	105	115
Enrolled	15	11	15	16	14	14	16

Chart V-10

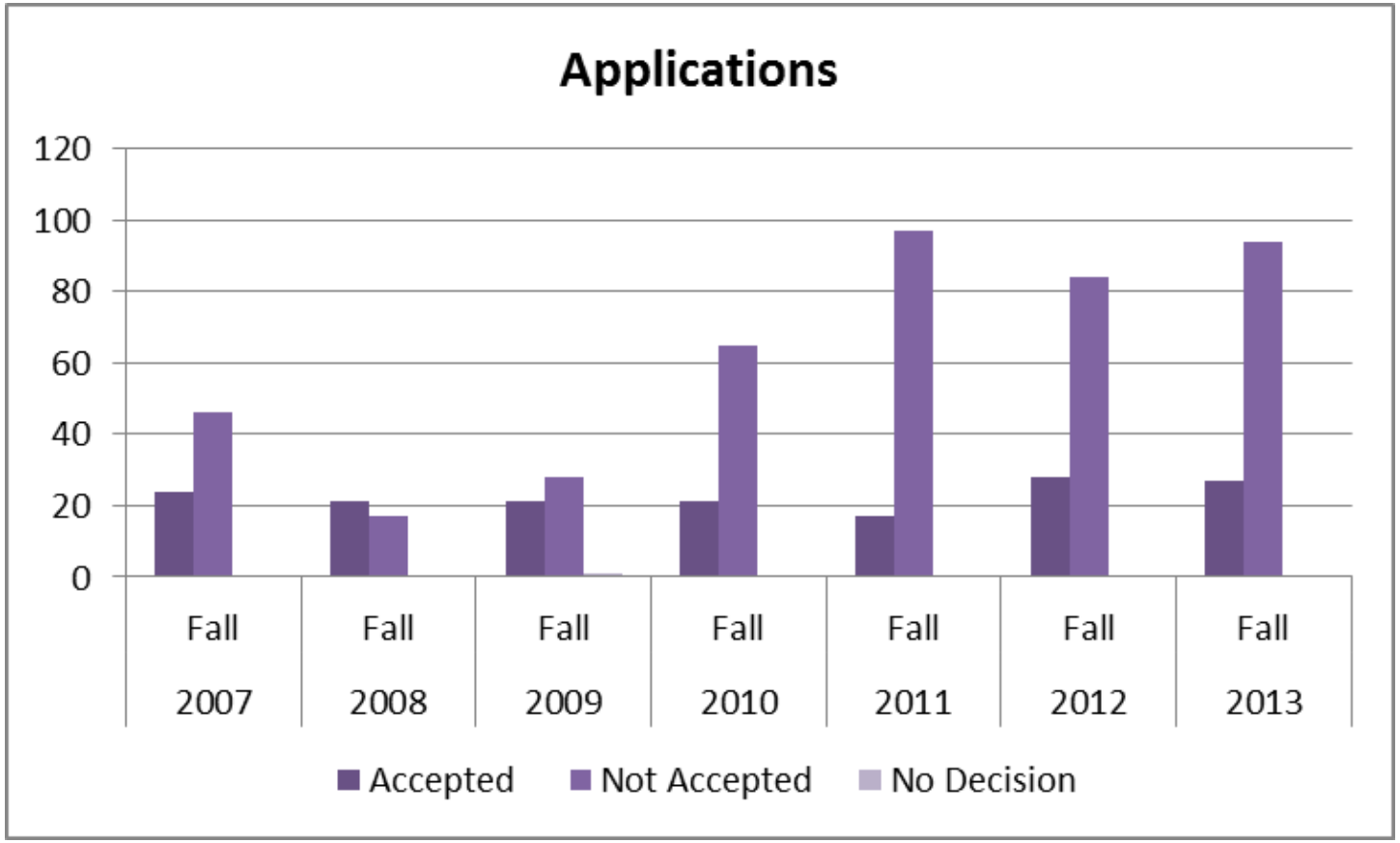
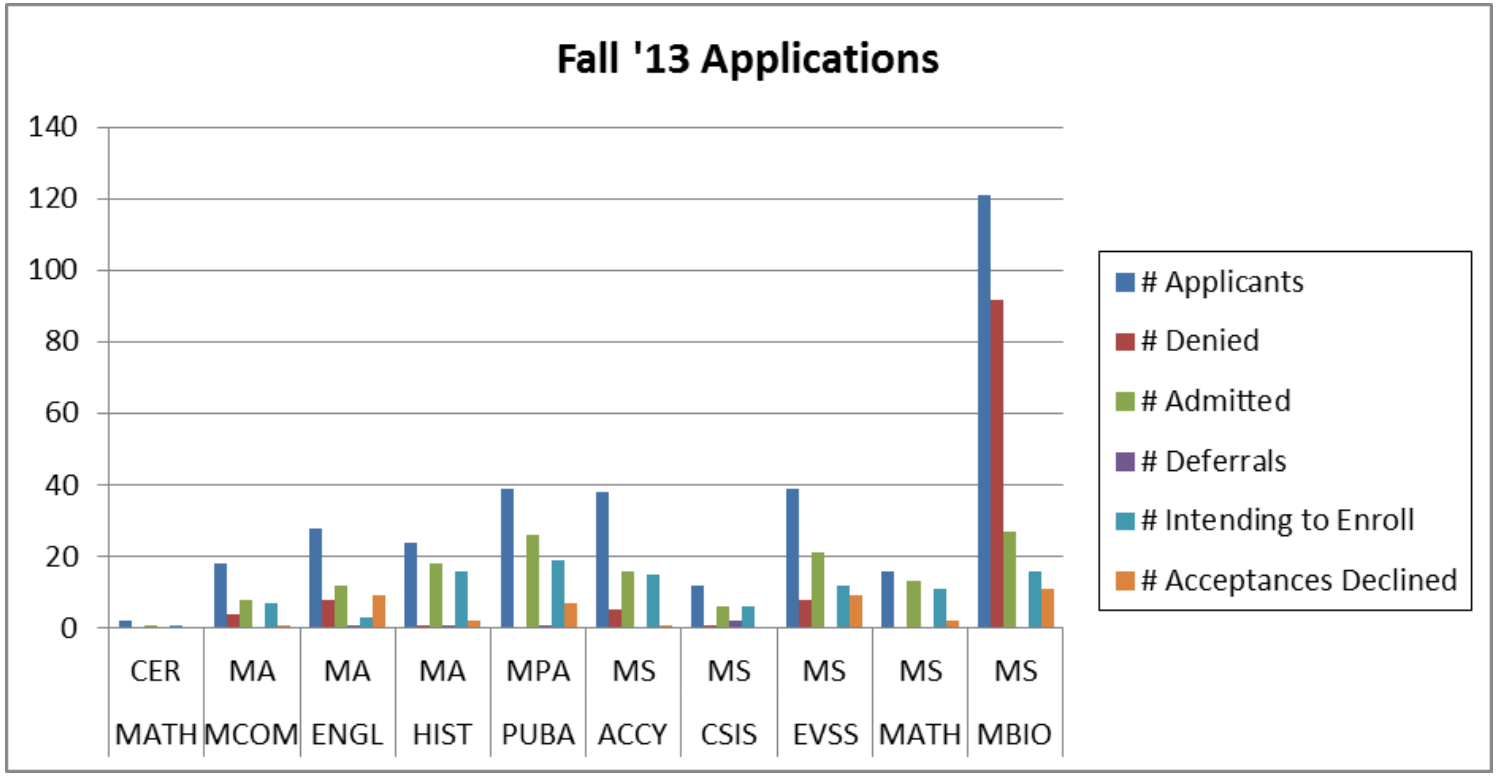

Applications
120
100
80
60
40
20
0
Fall 2007
Fall 2008
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Accepted
Not Accepted
No Decision

Fig. V-11


Fall '13 Applications
140
120
100
80
60
40
20
0
CER MATH
MA MCOM
MA ENGL
MA HIST
MPA PUBA
MS ACCY
MS CSIS
MS EVSS
MS MATH
MS MBIO
Applicants
Denied
Admitted
Deferrals
Intending to Enroll
Acceptances Declined

ii. Current students

The following table contains a list of the GPMB current students, their thesis topics and advisors. Students with no listed thesis topic are in their first year and are developing a thesis proposal. A list of former students can be found at: http://marinebiology.cofc.edu/prospective-students/grads/index.php

Student	**Thesis Topic**	**Major Advisor**	**email address**
Rebecca Balazs			sampsonrj@g.cofc.edu
Melissa Bernhard	Effects of PPARγ/RXRα Signaling on Sex Determination in the American Alligator,*Alligator mississippiensis*	Satomi Kohno	bernhardm@g.cofc.edu
Vanessa Bezy	Olive Ridley Sea Turtle (*Lepidochelys olivacea*) Embryo Mortality as a Function of the Nest Microbial Community at Ostional, Costa Rica	Craig Plante	bezyvs@g.cofc.edu
Hannah Bouchillon			bouchillonh@g.cofc.edu
Catherine Bridges	Characterization of the Red Fluorescence Associated with the Tissue Pigmentation Response (TPR) Observed in Cultured *Porites lobata*	Sylvia Galloway	bridgesmc@g.cofc.edu
David Coles	Scuba and Video Documentation of Fish Spawning at Gray's Reef National Marine Sanctuary	Marcel Reichert	colesdp@g.cofc.edu
Callie Crawford	Linking Molecular and Morphological Relationships in the Chondrichthyan Tree of Life	Gavin Naylor	crawfordch@g.cofc.edu
Hannah Day	A Mark-Recapture Study of the Diamondback Terrapin (*Malaclemys terrapin*) in Charleston	David Owens	dayhl@g.cofc.edu

	Harbor, South Carolina		
Alyssa Demko	Phylogenetic and Latitudinal Patterns in Seaweed Palatability toward Generalist Marine Herbivores	Erik Sotka	demkoam@g.cofc.edu
Becca Derex	The Role of Hydrogen Sulfide as a Signaling Molecule in the Hypoxia Response of *Callinectes sapidus*, the Atlantic Blue Crab	Karen Burnett	derexrl@g.cofc.edu
Sarah Doty	Diet Composition and Repopulation Rates of Lionfish on South Carolina Artificial Reefs	Gorka Sancho	smdoty@g.cofc.edu
Drew Duckett			duckettdj@g.cofc.edu
Liz Duermit	Stone Crab (*Menippe spp.*) Demographics in the Atlantic Coast Hybrid Zone and the Effect of Claw Removal on Mortality, Feeding Ability, and Growth	Dara Wilber	duermitea@g.cofc.edu
Bobby Edman			edmanrm@g.cofc.edu
Robin Frede			frederl@g.cofc.edu
Kelly Fridey		Fran Van Dolah	frideyka@g.cofc.edu
Janessy Frometa			frometaj@g.cofc.edu
Courtney Gerstenmaier	Community and Ecosystem Level Effects of Intraspecific Genetic Diversity: A Case Study Examining the Invasive Seaweed *Gracilaria vermiculophylla*	Erik Sotka	cegerste@g.cofc.edu
Zaida Hager		Marcel Reichert	hagerzf@g.cofc.edu
Whitney Heuring			heuringwl@g.cofc.edu

Whitney Hook	Antagonistic Interactions among Bacterial Populations of Marine Intertidal Sediments	Craig Plante	wfhook@g.cofc.edu
Janelle Johnson			johnsonj4@g.cofc.edu
Sharleen Johnson	Optimization and Validation of a Bioenergetics Model to Evaluate Habitat Suitability and Utilization for Coastal Striped Bass in the Southeastern United States	Tanya Darden	johnsonsp3@g.cofc.edu
Amanda Kelly	Life history trends of gray triggerfish *Balistes capriscus* in the South Atlantic Bight	Virginia Shervette	kellyam@g.cofc.edu
Nicole Kollars	The Ecological and Evolutionary Consequences of an Association Between the Invasive Seaweed *Gracilaria vermiculophylla* and the Native Polychaete *Diopatra cuprea*	Erik Sotka	kollarsnm@g.cofc.edu
Mark Lehtonen			lehtonenmp@g.cofc.edu
Jackie Leidig	Genetic Population Structure of Black Drum, *Pogonias cromis*, in U.S. Waters and Life History in South Carolina	Virginia Shervette	leidigjm@g.cofc.edu
Adam Lytton	Use of Bomb Radiocarbon in Age Validation on the North Atlantic Population of *Polyprion americanus*, Including Re-calculation of Natural Mortality Estimates from Life History Parameters	Marcel Reichert	arlytton@g.cofc.edu
Dominique Maldonado	The Influence of Nitrogen and Phosphorus on the Occurrences and Physiological Responses	Dianne Greenfield	damaldon@g.cofc.edu

	of Harmful Algal Bloom Species: Case Study of the Charleston Harbor and Winyah Bay Estuaries, South Carolina		
Andrea Margiotta	Can Rugosity be Used as a Management Tool to Reliably Characterize Oyster Habitat Vertical Complexity in South Carolina?	Dara Wilber	margiottaam@g.cofc.edu
Nicole McNabb			mcnabbna@g.cofc.edu
Weatherly Meadors	An Assessment of Red Drum, *Sciaenops ocellatus*, Exhibiting External Lesions Within South Carolina Estuaries	Isaure de Buron	wameador@g.cofc.edu
Chris Mealey			mealeyc@g.cofc.edu
Megan Meek	Growth Dynamics of Co-occurring *Karenia* Species in Gulf of Mexico Harmful Algal Blooms	Fran Van Dolah	meekme@g.cofc.edu
Tamara Morris		Peter Kingsley-Smith	morristl@g.cofc.edu
Bec Mortensen	Development of a Novel Genetic Tool for Rapid Identification of Red Drum (*Sciaenops ocellatus*) Eggs	Dianne Greenfield	mortensenra@g.cofc.edu
Michelle Reed	The Influence of Macronutrient Form on Spatial and Seasonal Variability of Phytoplankton Community Composition in Coastal South Carolina Waters	Dianne Greenfield	reedml@g.cofc.edu
Nicole Schanke	Photoprotective Ability of the Antarctic Diatom Fragilariopsis cylindrus in Response to Ultraviolet Radiation	Jack DiTullio	schanken@g.cofc.edu
Wiley Sinkus			sinkuswn@g.cofc.edu
Jason Smith	Effects of Irradiance Levels on the Expression of Ice-Binding Proteins in	Mike Janech	jpsmith005@gmail.com

	the Sea-Ice Diatom, *Fragilariopsis cylindrus*		
Meredith Smylie	Mercury Bioaccumulation in the Longnose Gar (*Lepisosteus osseus*): A Model Species for Examining Patterns of Hg Uptake Along a Salinity Gradient	Virginia Shervette	smyliems@g.cofc.edu
Jessica Snyder	Effects of Ultraviolet Radiation on Biogenic Sulfur in the Sea-Ice Diatom,*Fragilariopsis Cylindrus*	Jack DiTullio	snyderjs@g.cofc.edu
Sarah Song	The Effects of a Sub-Lethal Injection of the Bacterium *Vibrio campbelli* on Metabolism in the Penaeid Shrimps *Litopenaeus setiferus* and *Litopenaeus vannamei* During Sustained Exercise	Lou Burnett	songsm@g.cofc.edu
Claire Stegman			stegmance@g.cofc.edu
Anna Tommerdahl	Respiratory Properties of Hemocyanin from Wild and Aquacultured Penaeid Shrimp	Lou Burnett	tommerdahlap@g.cofc.edu
Hayley Townsend			townsendh@g.cofc.edu
A.J. Turner	Oviposition Site Preference in Scyliorhinid Shark Species	Peter Etnoyer	turneraj@g.cofc.edu
Liz Vinyard			vinyardea@g.cofc.edu
Jason Wang	Oxygen Binding Properties of Purified Hemocyanin Oligomers in Penaeid Shrimps*Litopenaeus vannamei* and *Farfantepenaeus aztecus*	Karen Burnett	wangj@g.cofc.edu
Ann Wassick			wassicka@g.cofc.edu
Hope Wertz		John Weinstein	wertzh@g.cofc.edu
Leslie Wickes	Growth, Distribution and Skeletal Structure of Deep-	Peter Etnoyer	wickesln@g.cofc.edu

	Water Constructional Scleractinia Under 'Acidified' Conditions in the Southern California Bight		

E. Recent Student Presentations/Awards

The GPMB emphasizes to students the benefits of attending discliplinary meetings and presenting research findings to scientific colleagues. Thus we encourage and financially support conference attendance. A high proportion of our students attend such conferences on an annual basis, many winning presentation awards.

i. Presentations

2007/2008

Courtney Arthur - Mercury in the Diamondback terrapin, *Malaclemys terrapin*. Oral presentation. Fourth Symposium on the Ecology, Status and Conservation of the Diamondback Terrapin. 10-12 August 2007, Millersville, MD.

Jessalyn Ierardi - Functional genomics of the North Atlantic right whale: The skin transcriptome and its potential use in the study of health and disease. 17th Biennial Meeting of the Society of Marine Mammalogy was held November 29-December 3, 2007, in Cape Town, South Africa.

Lindy Thibodeaux - Exposure to bacteria affects metabolism during activity and recovery in the Atlantic blue crab, *Callinectes sapidus*. Annual Meeting of the Society of Integrative and Comparative Biology, San Antonio, TX. January 2008.

Kim Wieber - Habitat associations of demersal fishes on the Charleston Bump and adjacent Blake Plateau. Joint Meeting of Ichthyologists and Herpetologists. St. Louis, MO. July 11-16, 2007.

Ginger Winder - Fluoxetine in the Marine Environment: Effects on Sheepshead Minnow (*Cyprinodon variegatus*) Brain Serotonin Activity and Locomotor Behavior. Joint Meeting of the Carolinas/Southeastern Chapter of Society of Environmental Toxicology and Chemistry. April 2007.

Ginger Winder - Fluoxetine in the Marine Environment: Effects on Sheepshead Minnow (*Cyprinodon variegatus*) Serotonin Activity and Locomotor Behavior. Poster presentation. Oceans and Human Health P.I. meeting. October 2007.

Ginger Winder - Toxicity of the antimicrobial compound triclosan in estuarine systems. Society of Environmental Toxicology and Chemistry North America Meeting. November 2007.

Ginger Winder - Fate and transport of Irgarol 1051 in a modular estuarine mesocosm. Poster presentation. Society of Environmental Toxicology and Chemistry North America Meeting. November 2007.

Ginger Winder - Effects of Fluoxetine on Sheepshead Minnow (*Cyprinodon variegatus*) Locomotor Activity. Spring 2008 Meeting: Southeastern Estuarine Research Society. March 2008.

2008/2009

Jesse Alderosn - Characterization of Injuries Exhibited by Free-Swimming Loggerhead Sea Turtles (Caretta caretta) in the Southeastern United States. International Sea Turtle Symposium, Brisbane, Australia, February 17-19, 2009.

Carole Berini - Pygmy sperm whale (Kogia breviceps, De Blainville 1838) strandings along the southeastern coast of the United States: an analysis of association with environmental factors. Southeast and Mid-Atlantic Marine Mammal Symposium, Wilmington NC, April 2009.

Melanie Hedgespeth - An assessment of the presence and fate of pharmaceuticals and personal care products (PPCPs) found in treated wastewater discharges into Charleston Harbor, South Carolina. Spring 2009 Annual Meeting of the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry, Charleston SC, March 27-28, 2009.

Jared Ragland - A Research Proposal: Do hydroxylated metabolites of PCBs and PBDEs disrupt the loggerhead endocrine system? Spring 2009 Annual Meeting of the Carolinas Chapter of the Society for Environmental Toxicology and Chemistry. Charleston, SC, March 27-28, 2009.

Katie Reiss - Assessment of hydroxylated organic contaminants and thyroid hormones in shark blood plasma from estuaries along the southeast coast of the US. Spring 2009 Annual Meeting of the Carolinas Chapter of the Society for Environmental Toxicology and Chemistry. Charleston, SC, March 27-28, 2009.

Nora Sturgeon - Bottlenose dolphins and the Atlantic blue crab fishery: A study of coincidence and interaction in Charleston Harbor, SC. 2009 SEAMAMMS conference April 3-5 2009.

2009/2010

Elizabeth Broyles - Diamondback terrapins (Malaclemys terrapin) of the Ashley River: Estimated Population Size, Sex Ratios, and Distribution. 2009 Joint Meeting of Ichthyologist and Herpetologist in Portland, Oregon (July 22-27)

Elizabeth Broyles - Terrapins of the Ashley River: Population, Sex Ratio and Distribution' at the South East Regional Diamondback Terrapin Working Group Meeting in Wilmington, NC (Dec 3)

Daniel Fernandes - Effects of association with eelgrass on the embryonic development of the gastropod *Haminoea vesicular*. SICB 2010 Meeting in Seattle

Jason Ferrante - Serum cytokines as predictors of domoic acid exposure in California sea lions, Zalophus californianus. 2009 The Society for Marine Mammalogy 18th Biennial Conference, Quebec, Canada

Jason Ferrante - Plasma cytokines as predictors of domoic acid toxicosis in California sea lions, Zalophus californianus. 2009 The Southeast and Mid-Atlantic Marine Mammal Symposium (SEAMAMMS), Wilmington, NC

Nat Johnson - Characterization of the Bacterial Properties that Impair Respiration in the Atlantic Blue Crab, Callinectes sapidus. Annual meeting of the Society for Integrative and Comparative Biology (SICB) in Seattle, WA

Megan Kent - Relative contribution of taxonomic groups within microbial biofloc communities to the growth of *Litopenaeus vannamei* when provided as dietary supplements. World Aquaculture Conference in Veracruz, Mexico

Joseph Pollock - A novel assay for the detection of the coral pathogen Vibrio coralliilyticus. 2009 Australian Coral Reef Society Conference in Darwin, Northern Territory, Australia September 25-27. 2009

Jared Ragland - Poster presentation at the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry (March 2009)

Jared Ragland - Platform Presentation at the 30th Annual North America Meeting of the Society of Environmental Toxicology and Chemistry (November 2009)

Katie Reiss - Assessment of Hydroxylated Organic Contaminants and Thyroid Hormones in Shark Blood Plasma from Estuaries along the Southeast Coast of the US. The Carolinas SETAC Meeting in Charleston, SC

Katie Reiss - Hydroxylated Organic Contaminants and Thyroid Hormones in Shark Blood Plasma from Estuaries along the Southeast Coast of the US. The North American SETAC Meeting in New Orleans, LA

David Shiffman - Led a workshop at the ecological society of America conference called "Using google earth software for ecological research"

David Shiffman - Gave a public education talk entitled "Why sharks matter: the ecological and economic importance of sharks, threats they face, and how you can help" at Yale University and Duke University

Nora Sturgeon: **Sturgeon NS**, J Powell, M Pate, T Speakman, K Coomer, W McFee. 2009. Bottlenose dolphins and the Atlantic blue crab fishery: A study of coincidence and interaction in Charleston Harbor, SC, USA. 18th Biennial Meeting of The Society for Marine Mammology, Quebec City, QC.

Nora Sturgeon: **Sturgeon NS**, J Powell, M Pate, T Speakman, K Coomer, W McFee. 2009. Bottlenose dolphins and the Atlantic blue crab fishery: A study of coincidence and interaction in Charleston Harbor, SC. The Southeast and Mid-Atlantic Marine Mammal Symposium, Wilmington, NC.

2010/2011

Jenn Bennett - The Effects of Irradiance on the Growth and Physiology of the Polar Diatom, *Fragilariopsis cylindrus*. The American Society of Limnology and Oceanography Aquatic Science Meeting in San Juan, Puerto Rico on Feb 15, 2011

Casey Darling - Impacts of hypoxia and hypercapnic hypoxia on the transcription of key antioxidants and protein synthesis genes in the shrimp *Litopeaneaus vannamei*. The Society for Integrative and Comparative Biology Conference in Salt Lake City on Jan 3-7 2011

Leah Fisher -Calculating body condition index for a loggerhead sea turtle (*Caretta caretta*) population to detect changes in population health relative to environmental factors. The 2011 International Symposium on Sea Turtle Biology and Conservation in San Diego, California (April 12-15th)

Nat Johnson - Characterization of the Bacterial Properties that Impair Respiration in the Atlantic Blue Crab, *Callinectes sapidus*. The Society for Comparative and Integrative Biology in Salt Lake City, Jan 3-7 2011

Anna Manyak - A latitudinal body size cline in the subtidal isopod (*Idotea baltica*) reflects local adaptation. The Benthic Ecology Meeting 2011 in Mobile, AL (March 16-18)

Weatherly Meadors - The molecular detection of putative paratenic hosts of the southern flounder philometrid species. The Southeastern Society of Parasitologists and Association of Southeastern Biologists joint meeting in Asheville, NC in April 2010

David Shiffman - Detection of an ontogenetic diet shift in a heavily exploited shark species using minimally-invasive stable isotope analysis. The Benthic Ecology Meeting in Mobile, AL, Science Online in Raleigh, NC, SC-AFS Meeting in Santee, SC, the American Elasmobranch Society Meeting in Minneapolis, MN and the International Marine Convservation Congress in Vancouver, Canada

David Shiffman – Gave shark conservation public lectures at many local schools including, James Island Charter High School, Ashley Hall, the Seirra Club South Carolina Assembly and at the Staten Island Academy in New York City

Sammi Smoot - Antimicrobial Properties of Molluscan Egg Masses in the San Juan Islands, Wa. The Society for Integrative and Comparative Biology Conference in Salt Lake City (Jan 3-7 2011)

Kristin Stover - Hexapedal locomotion and reproductive ability after fatigue in the Atlantic Blue Crab, *Callinectes sapidus* (Rathbun). The Society for Integrative and Comparative Biology Conference in Salt Lake City titled ' (Jan 3-7 2011)

Mark Stratton - Application of community indicators to the snapper grouper complex in southeastern U.S. Atlantic continental shelf waters. The Southern Division American Fisheries Society meeting in Tampa, FL on January 13-16, 2011

Chuck Tucker - Spawning Survey of Southern and Gulf Flounders (*Paralichthys lethostigma* and *P. albigutta*) using Scuba Off the South Carolina Coast. The 12th Flatfish Biology Conference 2010 on December 1, 2010 in Westbrook, CT

Jena Wirth - Comparison effects of in vitro PFOS exposure on bottlenose dolphin and murine immune function. The Society of Toxicology Annual Meeting on March 7 2011 in Washington DC

Jenn Bennett, **Walter Blair**, **Casey Darling**, **Cameron Doll**, **Anna Manyak**, **David Shiffman**, **Sammi Smoot**, **Mark Stratton** and **Kristin Stover** presented posters at the College of Charleston 5th annual Graduate Student Research Poster Session on January 20, 2011

2011/2012

Cameron Doll, **Leah Fisher**, and **Kristin Stover** - Poster presentations

Michelle D'Aguillo, **Casey Darling**, **Peter Feltman**, **Leah Fisher**, **Jacob Kendrick**, **Tim O'Donnell**, and **Jena Wirth** - Oral presentations

2012/2013

Katie Anweiler, **Vanessa Bezy**, **Callie Crawford**, **Robin Garcia**, **Nicole Kollars**, **Ashley Shaw**, **Sammi Smoot**, and **Anna Tommerdahl** - Poster presentations

Carly Altizer, **Drew Anderson**, **Katie Anweiler**, **Michelle D'Aguillo**, **Robin Garcia**, **Adam Lytton**, **Tim O'Donnell**, **Jennifer Newby**, **Ashley Shaw**, and **Sammi Smoot** - Oral presentations

ii. Student Awards

For many years, GPMB students have successfully competed for local and state (e.g., Slocum-Lunz) fellowships; however, few national awards were received. Over the last five years we have made a more concerted effort to encourage incoming students to pursue such awards, e.g., by devoting more time in the first-year seminars (Biol. 620 and 621) to locating funding sources and to proposal writing. In addition, we conducted an extracurricular workshop in 2012 to assist students in finding appropriate external funding opportunities. These efforts have resulted in more students, especially in first-year cohorts, competing for major national and international fellowships. For example, in recent years, 2-4 students per year (of a typical cohort of ~15) have applied for the NSF GRFP. Several students have been successful in obtaining prestigious national/international awards to help fund their research including an NSF-GRFP (V. Bezy), a Fulbright Fellowship (J. Pollock), and a National Geographic Society Young Explorers Award (Bezy). A more complete list of internal and external fellowships, in addition to presenation awards, is supplied below.

2007/2008

Tom Baird - Toxicity of selected conazole fungicides to the halotolerant chlorophyte *Dunaliella tertiolecta*: Sublethal effects on osmoregulatory function and lipid composition presented at the 2008 Graduate Research Colloquium. Tom won the best oral presentation award.

Lyndsey Lefebvre - Reproductive dynamics of cobia, *Rachycentron canadum*, in Port Royal Sound and St. Helena Sound SC presented at the SC chapter American Fisheries Society annual meeting. Lyndsey won the best student oral presentation award.

Joe Pollock - Fulbright Scholarship to study coral disease in Australia

Kim Wieber – American Institute of Fisheries Research Biologists - Research Assistance Award 2007

Courtney Arthur - John A. Knauss Marine Policy Fellowship to work with NOAA for a year in Washington DC

Luis Leandro - John A. Knauss Marine Policy Fellowship to work with NOAA for a year in Washington DC

Amanda McCarty - John A. Knauss Marine Policy Fellowship to work with NOAA for a year in Washington DC

Thomas Baird - Presidential Summer Research Award $3750

Claudia Friess - Presidential Summer Research Award $3750

Sara Jones - Presidential Summer Research Award $3750

Juliana Miller - Presidential Summer Research Award $3750

Carole Berini - Graduate School Research and Presentation Grant $500

Beth Cushman - Graduate School Research and Presentation Grant $500

Adair Dempsey - Graduate School Research and Presentation Grant $500

Meaghean Finnegan - Graduate School Research and Presentation Grant $500

Jen Fountain - Graduate School Research and Presentation Grant $500

Heather Harper - Graduate School Research and Presentation Grant $500

Jessalyn Ierardi - Graduate School Research and Presentation Grant $500

Suzanne Lane - Graduate School Research and Presentation Grant $500

Steven O'Connell - Graduate School Research and Presentation Grant $500

Katie Olds - Graduate School Research and Presentation Grant $500

Claire, Samaha - Graduate School Research and Presentation Grant $500

Lindy Thibodeaux - Graduate School Research and Presentation Grant $500

Heidi Williams - Graduate School Research and Presentation Grant $500

Kim Wieber - Graduate School Research and Presentation Grant $500

Marcus Zokan - Graduate School Research and Presentation Grant $500

Adair Dempsey - McLeod-Frampton Scholarship from the South Carolina Agricultural Society $5000

Jennifer Fountain - McLeod-Frampton Scholarship from the South Carolina Agricultural Society $5000

Jessalyn Ierardi - Marine Genomics Fellowship $20,000

Joe Pollock - Marine Genomics Fellowship $20,000

Artur Veloso - Marine Genomics Fellowship $20,000

Drew Wham - Marine Genomics Fellowship $20,000

Suzanne Kacenas - Joanna Deep Water Fellowship $3600

Ray Simpson - Joanna Deep Water Fellowship $3600

Drew Wham & Joe Pollock - A Genomic Analysis of Stress Response Proteins in The Starlet Sea Anemone *Nematostella vectensis* presented at the Second Annual Graduate Research Poster Session at the CofC. Drew and Joe won best Marine Biology Poster.

2008/2009

Jonathan Craft - Pre-doctoral fellowship to conduct research under Valerie Paul at the Smithsonian Marine Station in 2008. The work targeted elucidation of marine herbivore tolerance for macroalgal chemical defenses.

Daniel Fernandes - Alan Kohn Fellowship from the University of Washington at the Friday Laboratories for the Summer of 2009

Jen Fountain - Research Presentation Grant from the College of Charleston to attend the annual American Fisheries Society meeting in Ottawa, Canada in August 2008.

Megan Kent - Relative Contribution of Taxonomic Groups within Microbial Biofloc Communities to the Growth of *Litopenaeus vannamei* when Provided as Dietary Supplements presented at the 2009 Graduate Research Colloquium. Megan won the Sigma Xi award for best oral presentation.

Joe Pollock - Fulbright Fellowship to study coral disease in Australia

Jared Ragland - Awarded fist place for his poster presentation during the spring 2009 SETAC meeting

Nora Sturgeon - Joanna Deepwater Fellowship for the summer of 2009

Nora Sturgeon - Bottlenose dolphins and the Atlantic blue crab fishery: A study of coincidence and interaction in Charleston Harbor, SC presented at the 2009

SEAMAMMS conference April 3-5 2009. Nora was awarded a $500.00 Graduate Student Presentation grant for her presentation.

Steven O'Connell - Award at the 2009 Graduate Student Research Poster Session in the Science and Math category

Allie Kreutzer - Award at the 2009 Graduate Student Research Poster Session in the Science and Math category

Kolo Rathburn - Leo Higdon Presidential Legacy Award for Leadership. This is a College of Charleston ExCEL Award.

2009/2010

Jonathan Craft - Link Foundation/Smithsonian Institution Graduate Fellowship

Jonathan Craft - Lerner-Gray Grant for Marine Science

Jonathan Craft - Student Presentation Award at the 2010 Benthic Ecology Meeting

Daniel Fernandes - 2010 Grants In Aid Of Research Program (GIAR) award through the Society for Integrative and Comparative Biology (SICB)

Daniel Fernandes -Alan J. Kohn Endowed Fellowship through the Friday Harbor Labs, University of Washington

Jason Ferrante - Slocum-Lunz Foundation Award

Jason Ferrante - Graduate School Research Presentation Grant

Megan Kent - Second place Best Poster Award at the 2009 World Aquaculture Society Conference

Megan Kent - First place Student Oral Presentation Award at the triennial Aquaculture 2010

Megan Kent - NSF East Asia and Pacific Summer Institutes Fellowship to study in Taiwan over the summer of 2010.

Joseph Pollock - Sir Keith Murdoch USA to Australia Fellowship.

Joseph Pollock - PhD Mobility Scholarship from the Australian National Network in Marine Science

Joseph Pollock - International Research Fellowship from James Cook University

Jared Ragland - First place for his Poster Presentation at the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry

Jared Ragland - SETAC Student Travel Award

David Shiffman - Second place for his blog post in an internet-wide science writing competition that resulted in an interview on NPR's ' Pat Morrison Show'

Sammi Smoot - Patricia Dudley Fellowship at University of Washington, Friday Harbor Laboratories

Mark Stratton - Slocum-Lunz Foundation award

Mark Stratton - Lerner Gray Fund of the American Museum of Natural History award

Nora Sturgeon - Two Graduate School Research Presentation Grants to attend the 18th Biennial Meeting of The Society for Marine Mammology in Quebec City, QC and The Southeast and Mid-Atlantic Marine Mammal Symposium in Wil-mington, NC.

Nora Sturgeon - Joanna Deep Water Fellowship for the summer of 2009

Drew Wham - Full scholarship to attend the Summer Institute of Statistical Genetics at the University of Washington

2010/2011

Jenn Bennett - Student travel award, American Society of Limnology and Oceanography

Leah Fisher - McLeod-Frampton Scholarship

Leah Fisher - Student travel award, International Sea Turtle Society

Nat Johnson - Graduate Student Association Research Grant

David Shiffman - CofC 5th Annual Graduate Student Poster Session Best Marine Biology Poster

Sammi Smoot - 2011 Richard & Megumi Strathmann Fellowship

Mark Stratton - Graduate Student Association Research Grant

Jena Wirth - Joanna Deep Water Foundation Fellowship

2011/2012

Vanessa Bezy - Student Travel Award from International Sea Turtle Society

Vanessa Bezy - CofC Graduate Research Award

Peter Feltman - CofC Department of Biology Travel Award

Peter Feltman - CofC GPMB Travel Award

Peter Feltman - CofC Graduate School Presentation Grant

Peter Feltman - Carolina Lowcountry and Atlantic Travel Award

Leah Fisher - Joanna Deep Water Foundation Fellowship

Leah Fisher - PADI Foundation Research Grant

Leah Fisher - Charleston Scientific and Cultural Education Fund Research Grant

Leah Fisher - Honorable Mention for NSF Graduate Research Fellowship

Leah Fisher - Runner-Up Best Student Poster Award at the Southeast Regional Sea Turtle Meeting

Leah Fisher - Student Travel Grant from International Sea Turtle Society

Weatherly Meadors - McLeod-Frampton Scholarship

Sammi Smoot - Joanna Deep Water Foundation Fellowship

Kristen Stover - Best Oral Presentation at the 2011 CofC Research Colloquium

Anna Tommerdahl - Phi Kappa Phi Love of Learning Scholarship

2012/2013

Vanessa Bezy - National Science Foundation Graduate Research Fellowship Program

Vanessa Bezy - Young Explorers Grant, National Geographic Society

Vanessa Bezy - PADI Foundation Grant

Vanessa Bezy - Archie Carr Award for Best Poster and Student Travel Award, International Sea Turtle Society

Vanessa Bezy - Summer Marine Genomics Fellowship

Vanessa Bezy - CofC Graduate Student Research Award

Vanessa Bezy - GSA Research Grant

Vanessa Bezy - MBGSA Travel Grant

Vanessa Bezy - GPMB Travel Grant

Sarah Doty - Lerner-Gray Grant

Sarah Doty - GPMB Travel Award

Robin Garcia - Student Travel Award from Southeastern Estuarine Research Society

Robin Garcia - GPMB Travel Award

Robin Garcia - CofC Graduate Student Association Grant

Amanda Kelly - Best Poster at the 2012 CofC Student Research Colloquium

Nicole Kollars - ZEN student-exchange research fellowship in North Japan

Nicole Kollars - Travel award from the Northwest Algal Symposium

Nicole Kollars - Presidential Summer Research Award

Weatherly Meadors - McLeod-Frampton Scholarship

Tim O'Donnell - Best Oral Presentation at the 2012 CofC Student Research Colloquium

Sammi Smoot - Joanna Deep Water Foundation Fellowship

F. Recent GPMB Student Publications

For a complete listing of past Grice publications see:
http://gricemarinelab.cofc.edu/research/scholarly-contributions/index.php

GPMB Students are **in bold**.

1. **Gillett, D. J.**, A. F. Holland, and D. M. Sanger. 2005. Secondary production of a dominant oligochaete (*Monopylephorus rubroniveus*) in the tidal creeks of South Carolina and its relation to ecosystem characteristics. Limnology and Oceanography, Vol. 50, No. 2, pp. 566-577.
2. **Rowe, J. J.** and G. R. Sedberry. 2006. Integrating GIS with fishery survey historical data: A possible tool for designing marine protected areas. Proceedings of the Gulf and Caribbean Fisheries Institute, 57, pp. 9-30.
3. **Burgents, J. E.**, L. E. Burnett, E. V. Stabb, and K. G. Burnett. 2005. Localization and bacteriostasis of Vibrio introduced into the Pacific white shrimp, *Litopenaeus vannamei*. Developmental and Comparative Immunology, Vol. 29, pp. 681-691.
4. DiTullio, G. R., M. E. Geesey, **J. M. Maucher, M. B. Alm**, **S. F. Riseman**, and K. W. Bruland. 2005. Influence of iron on algal community composition and physiological status in the Peru upwelling system. Limnology and Oceanography, Vol. 50, No. 6, pp. 1887-1907.
5. **Burgents, J. E.**, K. G. Burnett, and L. E. Burnett. 2005. Effects of hypoxia and hypercapnic hypoxia on the localization and the elimination of *Vibrio campbellii* in *Litopenaeus vannamei*, the Pacific white shrimp. Biological Bulletin, Vol. 208, pp. 159-168.
6. Keller, J. M., P. D. McClellan-Green, **A. Michelle Lee**, M. D. Arendt, P. R. Maier, A. L. Segars, J. D. Whitaker, D. E. Keil, and M. M. Peden-Adams. 2005. Mitogen-induced lymphocyte proliferation in Loggerhead Sea Turtles: Comparison of methods and effects of gender, plasma testosterone concentration, and body condition on immunity. Veterinary Immunology and Immunopathology, 103, pp. 269-281.
7. **Day, R. D.**, S. J. Christopher, P. R. Becker, and D. W. Whitaker. 2005. Monitoring mercury in the Loggerhead Sea Turtle, *Caretta caretta*. Environmental Science & Technology, Vol. 39, No. 2, pp. 437-446.
8. **Adams, L. D.** and P. E. Rosel. 2006. Population differentiation of the Atlantic Spotted Dolphin (*Stenella frontalis*) in the western North Atlantic, including the Gulf of Mexico. Marine Biology, Vol. 148, pp. 671-681.
9. **Lawton, J. C.**, P. L. Pennington, K. W. Chung, and G. I. Scott. 2006. Toxicity of atrazine to the juvenile hard clam, *Mercenaria mercenaria*. Ecotoxicology and Environmental Safety. Vol. 65, pp. 388-394.
10. **Drymon, J. M.**, W. B. Driggers, III, D. Oakley, and G. F. Ulrich. 2007. Investigating life history differences between Finetooth Sharks, *Carcharhinus isodon*, in the northern Gulf of Mexico and the western North Atlantic Ocean. Gulf of Mexico Science, Vol. 24, No. 1/2, pp. 2-10. [Dated 2006, but published in 2007.]
11. Burnett, L. E., J. D. Holman, D. D. Jorgensen, **J. L. Ikerd**, and K. G. Burnett. 2006. Immune defense reduces respiratory fitness in *Callinectes sapidus*, the Atlantic blue crab. Biological Bulletin, Vol. 211, pp. 50-57.

12. **Filipowicz, A. B.**, J. E. Weinstein, and D. M. Sanger. 2007. Dietary transfer of fluoranthene from an estuarine oligochaete (*Monopylephorus rubroniveus*) to grass shrimp (*Palaemonetes pugio*): Influence of piperonyl butoxide. Marine Environmental Research, Vol. 63, No. 2, pp. 132-145.
13. **Burgos, J. M.**, G. R. Sedberry, D. M. Wyanski, and P. J. Harris. 2007. Life history of Red Grouper (*Epinephelus morio*) off the coasts of North Carolina and South Carolina. Bulletin of Marine Science, Vol. 80, No. 1, pp. 45-65.
14. **Bolton-Warberg, M.**, L. D. Coen, and J. E. Weinstein. 2007. Acute toxicity and acetylcholinesterase inhibition in grass shrimp (*Palaemonetes pugio*) and oysters (*Crassostrea virginica)* exposed to the organophosphate dichlorvos: Laboratory and field studies. Archives of Environmental Contamination and Toxicology, Vol. 252, No. 2, pp. 207-216.
15. **Brugler, M. R.**, and S. C. France. 2007. The complete mitochondral genome of the black coral *Chrysopathes formosa* (Cnidaria: Anthozoa: Antipatharia) supports classification of antipatharians within the Subclass Hexacorallia. Molecular Phylogenetics and Evolution, Vol. 42, pp. 776-788.
16. **Vecchio, J. L.** and C. A. Wenner. 2007. Catch-and-release mortality in sub-adult and adult Red Drum using popular fishing hook types. North American Journal of Fisheries Management, Vol. 27, pp. 891-899.
17. **Gillett, D. J.**, A. F. Holland, and D. M. Sanger. 2007. On the ecology of oligochaetes: Monthly variation of community composition and environmental characteristics in two South Carolina tidal creeks. Estuaries and Coasts, Vol. 30, No. 2, pp. 238-252.
18. **Pante, E.**, M. Adjeroud, P. Dustan, L. Penin, and M. Schrimm. 2006. Spatial patterns of benthic invertebrate assemblages within atoll lagoons: Importance of habitat heterogeneity and considerations for marine protected area design in French Polynesia. Aquatic Living Resources, Vol. 19, pp. 207-217.
19. **Blanvillain, G.**, **J. A. Schwenter**, R. D. Day, D. Point, S. J. Christopher, W. A. Roumillat, D. W. Owens. 2007. Diamondback terrapins, *Malaclemys terrapin*, as a sentinel species for monitoring mercury pollution of estuarine systems in South Carolina and Georgia, USA. Environmental Toxicology and Chemistry, Vol. 26, No. 7, pp.1441-1450.
20. **Brunelle, S. A.**, E. S. Hazard, E. E. Sotka, and F. M. Van Dolah. 2007. Characterization of a dinoflagellate cryptochrome blue-light receptor with a possible role in circadian control of the cell cycle. Journal of Phycology, Vol. 43, No. 3, pp. 509-518.
21. DeLorenzo, M. E., **L. Serrano**, K. W. Chung, **J. Hoguet**, and P. B. Key. 2006. Effects of the insecticide permethrin on three life stages of the grass shrimp, *Palaemonetes pugio*. Ecotoxicology and Environmental Safety, Vol. 64, pp. 122-127.
22. **Serrano, L**. and M. E. DeLorenzo. 2008. Water quality and restoration in a coastal subdivision stormwater pond. Journal of Environmental Management. Vol. 88, pp. 43-52.

23. **Pante, E.**, A. King, and P. Dustan. 2008. Short-term decline of a Bahamian patch reef coral community: Rainbow Gardens Reef 1991-2004. Hydrobiologia, Vol. 596, No. 1, pp. 121-132.
24. DeLorenzo, M. E., and **L. Serrano**. 2006. Mixture toxicity of the antifouling compound irgarol to the marine phytoplankton species *Dunaliella tertiolecta*. Journal of Environmental Science and Health, Part B, 41(8), pp. 1349-1360.
25. DeLorenzo, M. E., J. M. Keller, **C. D. Arthur**, **M. C. Finnegan**, **H. E. Harper**, **V. L. Winder**, and **D. L. Zdankiewicz**. 2008. Toxicity of the antimicrobial compound triclosan and formation of the metabolite methyl-triclosan in estuarine systems. Environmental Toxicology, Vol. 23, pp. 224-232.
26. **Shapo, J. L.**, P. D. Moeller, and S. B. Galloway. 2007. Antimicrobial activity in the common seawhip, *Leptogorgia virgulata* (Cnidaria: Gorgonaceae). Comparative Biochemistry and Physiology, Part B 148, pp. 65-73.
27. **Recks, M. A.**, and G. T. Seaborn. 2008. Variation in fatty acid composition among nine forage species from a southeastern US estuarine and nearshore coastal ecosystem. Fish Physiology and Biochemistry, Vol. 34, pp. 275-287.
28. **Filer, K. R.** and G. R.Sedberry. 2008. Age, growth and reproduction of the barrelfish *Hyperoglyphe perciformis* (Mitchill) in the western North Atlantic. Journal of Fish Biology, Vol. 72, pp. 861-882.
29. Macey, B. M., **C. K. Rathburn**, **L. K. Thibodeaux**, L.E.Burnett, and K. G. Burnett. 2008. Clearance of *Vibrio campbellii* injected into the hemolymph of *Callinectes sapidus*, the Atlantic blue crab: The effects of prior exposure to bacteria and environmental hypoxia. Fish and Shellfish Immunology, Vol. 25, pp. 718-730.
30. **Allen, S. M.** and L. E. Burnett. 2008. The effects of intertidal air exposure on the respiratory physiology and the killing activity of hemocytes in the Pacific Oyster, *Crassostrea gigas* (Thunberg). Journal of Experimental Marine Biology and Ecology, Vol. 357, pp. 165-171.
31. **Finnegan, M.C.**, S. Pittman, and M.E. DeLorenzo. 2009. Lethal and sublethal toxicity of the antifoulant compound irgarol 1051 to the mud snail *Ilyanassa obsoleta*. Archives of Environmental Contamination and Toxicology, Vol. 56, pp. 85-95.
32. **Harper, H. E.**, P. L. Pennington, J. Hoguet, and M. H. Fulton. 2008. Lethal and sublethal effects of the pyrethroid, bifenthrin, on grass shrimp (*Palaemonetes pugio*) and sheepshead minnow (*Cyprinodon variegatus*). Journal of Environmental Science and Health, Part B, Vol. 43, pp. 476-483.
33. **Robinson, J.D.**, and R.T. Dillon Jr. 2008. Genetic divergence among sympatric populations of three species of oyster drills (Urosalpinx) in Cedar Key, Florida. Bulletin of Marine Science, Vol. 82, No. 1, pp. 19-31.
34. Sotka, E. E., **A. McCarty**, and H. B. Giddens. 2010. Are tropical herbivores more tolerant of chemically rich seaweeds than are temperate herbivores? A test of seaweed-herbivore coevolution. Proceedings of the 11th International Coral Reef

Symposium, Ft. Lauderdale, Florida, 7-11 July 2008, Mini-Symposium 9, pp. 280-284.
35. **Williams, H.R.**, B.M. Macey, L.E. Burnett and K.G. Burnett. 2009. Differential localization and bacteriostasis of *Vibrio campbellii* among tissues of the Eastern oyster, *Crassostrea virginica*. Developmental and Comparative Immunology, Vol. 33, pp. 592-600.
36. **Schobernd, C. M.** and G. R. Sedberry. 2009. Shelf-edge and upper-slope reef fish assemblages in the South Atlantic Bight: Habitat characteristics, spatial variation, and reproductive behavior. Bulletin of Marine Science, Vol. 84, No. 1, pp. 67-92. [Available Online: 19 November 2008.]
37. **Fountain, J.**, T. Darden, W. Jenkins, and M. Denson. 2009. Three multiplexed microsatellite panels for Striped Bass. Southeastern Naturalist, Vol. 8, No.4, pp. 671-676.
38. **Fiore, C.L.** and P.C. Jutte. 2010. Characterization of macrofaunal assemblages associated with sponges and tunicates collected off the southeastern United States. Invertebrate Biology, Vol. 129, No. 2, pp. 105-120.
39. Sotka, E. E., **A. McCarty**, E. A. Monroe, N. Oakman, and F. M. Van Dolah. 2009. Benthic herbivores are not deterred by brevetoxins produced by the red tide dinoflagellate *Karenia brevis*. Journal of Chemical Ecology, Vol. 35, pp. 851-859.
40. **Thibodeaux, L. K.**, K. G. Burnett, and L. E. Burnett. 2009. Energy metabolism and metabolic depression during exercise in *Callinectes sapidus*, the Atlantic blue crab: effects of the bacterial pathogen *Vibrio campbellii*. Journal of Experimental Biology, 212, pp. 3428-3439.
41. Macey, B. M., M. J. Jenny, **H. R. Williams**, **L. K. Thibodeaux**, M. Beal, J. S. Almeida, C. Cunningham, A. Mancia, G. W. Warr, E. J. Burge, A. F. Holland, P. S. Gross, S. Hikima, K. G. Burnett, L. Burnett, and R. W. Chapman. 2010. Modelling interactions of acid-base balance and respiratory status in the toxicity of metal mixtures in the American oyster *Crassostrea virginica*. Comparative Biochemistry and Physiology, Part A, 155, pp. 341-349.
42. **Pollock, F. J.**, B. Wilson, W. R. Johnson, P. J. Morris, B. L. Willis, and D. G. Bourne. 2010. Phylogeny of the coral pathogen *Vibrio coralliilyticus*. Environmental Microbiology Reports, Vol. 2, No. 1, pp. 172-178.
43. **Javonillo, R.** and A. S. Harold. 2010. A systematic review of the genus Chasmodes (Teleostei: Perciformes: Blenniidae). Zootaxa, 2558, pp. 1-16.
44. Plante, C. J., S. Feipel, and **J. L. Wilkie**. 2010. Disturbance effects of deposit feeding on microalgal community structure and mechanisms of recolonization. Journal of Phycology, Vol. 46, pp. 907-916.
45. Easley, J. T., **S. N. Hymel**, and C. J. Plante. 2005. Temporal patterns of benthic microalgal migration on a semi-protected beach. Estuarine Coastal and Shelf Science, Vol. 64, pp. 486-496.
46. **Bubley, W. J.** and O. Pashuk. 2010. Life history of a simultaneously hermaphroditic fish, *Diplectrum formosum*. Journal of Fish Biology, Vol. 77, pp. 676-691.

47. **Friess, C.** and G.R. Sedberry. 2011. Age, growth, and spawning season of red bream (*Beryx decadactylus*) off the southeastern United States. Fishery Bulletin, Vol. 109, No. 1, pp. 20-33.
48. **Friess, C.**, and G.R. Sedberry. 2011. Genetic evidence for a single stock of the deep-sea teleost *Beryx decadactylus* in the North Atlantic Ocean as inferred from mtDNA control region analysis. Journal of Fish Biology, Vol. 78, No. 2, pp. 466-478.
49. **Washburn, T.** and D. Sanger. In press. Land use effects on macrobenthic communities in southeastern United States tidal creeks. Environmental Monitoring and Assessment,
50. **Ziskin, G. L.**, P. J. Harris, D. M. Wyanski, and M. J. M. Reichert. 2011. Indications of continued overexploitation of Speckled Hind along the Atlantic Coast of the southeastern United States. Transactions of the American Fisheries Society, Vol. 140, No. 2, pp. 384-398.
51. **Ragland, J. M.**, M. D. Arendt, J. R. Kucklick, and J. M. Keller. 2011. Persistent organic pollutants in blood plasma of satellite-tracked adult male loggerhead sea turtles (*Caretta caretta).* Environmental Toxicology and Chemistry, Vol. 30, No. 7, pp. 1549–1556.
52. **Pollock, F. J.**, B. Wilson, W. R. Johnson, P. J. Morris, B. L. Willis, and D. G. Bourne. 2010. Phylogeny of the coral pathogen *Vibrio coralliilyticus*. Environmental Microbiology Reports Vol. 2, No.1, pp. 172-178.
53. **Pollock, F. J.**, P. J. Morris, B. L. Willis, and D. G. Bourne. 2010. Detection and quantification of the coral pathogen *Vibrio coralliilyticus* by real-time PCR with TaqMan fluorescent probes. Applied and Environmental Microbiology, Vol. 76, No. 15, pp. 5282-5286.
54. **Johnson, N. G.**, L. E. Burnett, and K. G. Burnett. 2011. Properties of bacteria that trigger hemocytopenia in the Atlantic blue crab, *Callinectes sapidus*. Biological Bulletin, Vol. 221, pp. 164-175.
55. Sapozhnikova, Y., **M. Hedgespeth**, E. Wirth, and M. Fulton. 2011. Analysis of selected natural and synthetic hormones by LC-MS-MS using the US EPA Method 1694. Analytical Methods, Vol. 3, pp. 1079-1086.
56. Lyon, B. R., P. A. Lee, **J. M. Bennett**, G. R. DiTullio, and M. G. Janech. In press. Proteomic analysis of a sea-ice diatom; salinity acclimation provides new insight into the dimethylsulfoniopropionate production pathway. Plant Physiology,
57. **Pante E.** and P. Dustan. 2012. Getting to the point: Accuracy of point count in monitoring ecosystem change. Journal of Marine Biology, Vol. 2012, pp. 1-7.
58. **McLenon, A. L.**, and G. R. DiTullio. In press. Effects of increased temperature on oxidative stress, methionine synthase activity, and DMSP levels in the marine dinoflagellate *Symbiodinium microadriaticum*. Biogeochemistry.
59. **Lefebvre, L. S.** and M. R. Denson. 2012. Inshore spawning of cobia, *Rachycentron canadum*, in South Carolina. Fishery Bulletin Vol. 110, No. 4, pp. 397-412.

60. **Craft, J. D.**, V. J. Paul, and E. E. Sotka. In press. Biogeographic and phylogenetic effects on feeding resistance of generalist herbivores toward plant chemical defenses. Ecology.
61. **McCarty, A. M.** and E. E. Sotka. In press. Geographic variation in feeding preference of a generalist herbivore: The importance of seaweed chemical defenses. Oecologia.
62. **Washburn, T.** and D. Sanger. In press. Microhabitat variability of macrobenthic organisms within tidal creek systems. Hydrobiologia.
63. **Hedgespeth, M. L.**, Y. Sapozhnikova, P. Pennington, A. Clum, A. Fairey, and E. Wirth. 2012. Pharmaceuticals and personal care products (PPCPs) in treated wastewater discharges into Charleston Harbor, South Carolina. Science of the Total Environment, 437, pp. 1-9.
64. **Manyak, A.**, T. M. Bell, and E. E. Sotka. In press. The relative importance of predation risk and water temperature in maintaining Bergmann's rule in a marine ectotherm. American Naturalist.
65. **Stover, K. K.**, K. G. Burnett, E. J. McElroy, and L. E. Burnett. 2013. Locomotory fatigue and size in the Atlantic Blue Crab, *Callinectes sapidus*. Biological Bulletin, Vol. 224, pp. 63-67.
66. **Stover, K. K.**, K. G. Burnett, E. J. McElroy, and L. E. Burnett. 2013. Locomotory fatigue during moderate and severe hypoxia and hypercapnia in the Atlantic Blue Crab, *Callinectes sapidus*. Biological Bulletin, Vol. 224, pp. 68-78.
67. **Rathburn, C. K.**, N. J. Sharp, J. C. Ryan, M.G. Neely, M.Cook, R. W. Chapman, L. E. Burnett, and K. G. Burnett. 2013. Transcriptomic responses of juvenile Pacific whiteleg shrimp, *Litopenaeus vannamei*, to hypoxia and hypercapnic hypoxia. Physiological Genomics, Vol. 45, pp. 794-807.
68. **O'Connell, S. G.**, M. Arendt, A. Segars, T. Kimmell, J. Braun-McNeil, L. Avens, B. Schroeder, L. Ngai, J. R. Kucklick, and J. M. Keller. 2010. Temporal and spatial trends of perfluorinated compounds in juvenile loggerhead sea turtles (*Caretta caretta*) along the east coast of the United States. Environmental Science & Technology, Vol. 44, No. 13, pp. 5202-5209.
69. **Ellisor D.**, W. McLellan, H. Koopman, L. Schwacke, W. McFee, J. Kucklick. 2013. The distribution and stratification of persistent organic pollutants and fatty acids in bottlenose dolphin (*Tursiops truncatus*) blubber. Science of the Total Environment, 463-464, pp. 581-588.
70. **Wirth, J. R.**, M. M. Peden-Adams, N. D. White, G. D. Bossart, and P. A. Fair. 2013. In vitro PFOS exposure on immune endpoints in bottlenose dolphins (*Tursiops truncatus*) and mice. Journal of Applied Toxicology, 9 pp. [Published online (wileyonlibrary.com) DOI 10.1002/jat2891.]
71. **Rafalowski, S.** and C. Plante. 2013. Non-equilibrium processes structuring benthic bacterial communities following deposit feeding by a sea cucumber. Marine Ecology Progress Series, Vol. 478, pp. 115-126.

G. Student Financial Support

Marine Biology
Official Breakdown of Financial Aid to GPMB Students (2010-2013)

Degree Seeking Student Information	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Declared Majors	45	45	48	50
Types of Financial Aid Given				
Students with at least 1 FA Loan	15	13	17	14
Other Financial Aid (Grants, Fellowships, Scholarships, Assistantships)				
ACADEMIC ACHIEVEMENT AWARD				
C O C FOUNDATION SCH				
EXCHANGE CLUB OF CHARLESTON SCH				
GENERAL OUTSIDE SCHOLARSHIP		1	2	5
GK-12 Science Partners Fellows				
GK-12 Science Partners Tuition				
GRADUATE ABATEMENT	32	37	39	38
GRADUATE ASSISTANTSHIP	0	0	6	3
GRADUATE INCENTIVE FELLOWSHIP				
GRADUATE SCHOLARS AWARD		1	2	2
GRADUATE SCHOLARSHIP				1
GRICE MARINE LAB GRAD. SCHOLAR				
Graduate SUMMER RESEARCH AWARD	4	4	4	4
JOANNA FELLOWSHIP	2	2	2	2
MERIT SCHOLARSHIP (BKS)				

McLeod Frampton Graduate	1	1	1	1
NON-COLLEGE WORK STUDY	7	7	5	11
RESEARCH ASSISTANTSHIP	18	10	14	12
SC SPACE GRANT CONSORTIUM				
SC SEAGRANT FELLOWSHIP			2	2
SEA GRANT TERRAPIN GRANT				
TEACHING ASSISTANTSHIP	23	28	27	24
All Misc Outside Scholarships				2
SC Graduate Scholarship Award			1	
Sea Grant Triggerfish Bal			1	
Summary				
Students with some type of Financial Aid (unduplicated)	33	39	41	42
Students with no Financial Aid	12	6	7	8

Although the College's Office of Institutional Research, Planning and Information Management (IRP) was unable to provide data for the years 2007-2009, and the data categorization has changed since the last Self Study, the data provided below allow some ability to track funding patterns over the long term:

Marine Biology
Official Breakdown of Financial Aid to GPMB Students (1995-2006)

Degree Seeking Student Information												
	Fall 1995	**Fall 1996**	**Fall 1997**	**Fall 1998**	**Fall 1999**	**Fall 2000**	**Fall 2001**	**Fall 2002**	**Fall 2003**	**Fall 2004**	**Fall 2005**	**Fall 2006**
Declared Majors	51	49	49	55	54	48	53	51	54	45	57	55
Types of Financial Aid Given												
Students with at least 1 FA Loan	18	18	26	17	24	21	24	26	16	14	15	21
Other Financial Aid (Grants, Fellowships, Scholarships, Assistantships)												
ACADEMIC ACHIEVEMENT AWARD		5										
C O C FOUNDATION SCH		2	7									
EXCHANGE CLUB OF CHARLESTON SCH		1										
GENERAL OUTSIDE SCHOLARSHIP												1
GK-12 Science Partners Fellows								4	4	4	3	1
GK-12 Science Partners Tuition								4	4	4	3	
GRADUATE ABATEMENT	24	24	22	21	25	23	24	24	20	24	32	30
GRADUATE ASSISTANTSHIP	1	1	3	1	7	8	1	3		2	4	1
GRADUATE INCENTIVE FELLOWSHIP			1	1								
GRADUATE SCHOLARS AWARD							1			1		
GRADUATE SCHOLARSHIP			1									
GRICE MARINE LAB GRAD. SCHOLAR							1	3	1			
Graduate SUMMER RESEARCH AWARD									3	4	4	
JOANNA FELLOWSHIP					2	4	5	1	3	1	2	
MERIT SCHOLARSHIP (BKS)				6								
McLeod Frampton Graduate											2	1
NON-COLLEGE WORK STUDY	33	42	41	46	37	31	29	30	30	25	25	10
RESEARCH ASSISTANTSHIP	4	1	7	6	8	5	14	9	12	1	29	22
SC SPACE GRANT CONSORTIUM	1											
SEA GRANT TERRAPIN GRANT											1	2
TEACHING ASSISTANTSHIP	28	26	23	27	23	20	24	20	20	25	28	20
Summary												

Students with some type of Financial Aid (unduplicated)	47	44	42	47	43	36	44	43	42	39	47	42
Students with no Financial Aid	4	5	7	8	11	12	9	8	12	6	10	13

Two clear trends are the decrease in RAs + NWS funding through time and an increase in tuirition abatements through time.

H. Recent Graduates

A summary of the current postions of our 146 GPMB MS graduates for the past ten years (2003 to the present) reveals the following:

46%	Marine Science/Biology careers (MS level)
28%	PhD research or teaching or currently in PhD programs
6%	Teaching (High school or college)
9%	Other Science careers or not in science (sales, design)
11%	Other (e.g., deceased, homemaker, unknown)

A complete listing of the program's graduates, their thesis topics, and their current positions can be found at
http://marinebiology.cofc.edu/prospective-students/grads/index.php

By far the largest percentage of our graduates find their first employment immediately after graduation in the Charleston area and often right here at Fort Johnson. It is also noteable that a high percentage of our students remain in an area of marine science.

VI. CURRICULUM

The Graduate Program in Marine Biology has a structured curriculum with a minimum of 30 semester hours of graduate credit are required for the MS degree. In order to guarantee that students graduate well versed in marine science, they are required to complete a curriculum consisting of the following courses: Physiology and Cell Biology of Marine Organisms, Ecology of Marine Organisms, Physical Oceanography, Biometry, three one-credit seminars, four thesis credits, and two electives totaling at least 7 credit hours (see course list below).

A. Coursework Requirements

During the first year in the Program, students are required to take the following 6 core courses (credit number indicated in parentheses):

BIOL 600 *Physiology and Cell Biology of Marine Organisms* (4)
BIOL 601 *Ecology of Marine Organisms* (4)
BIOL 610 *Physical Oceanography* (4)
BIOL 611 *Biometry* (4)
BIOL 620 *Graduate Core Seminar* (Fall) (1)
BIOL 621 *Graduate Core Seminar* (Spring) (1)

After completion of their first year in the graduate program, students must complete the following:

1. One unit of seminar (BIOL 650 Seminar in Marine Biology)
2. One course in organismal biology (4 units), typically from the following list:
   - BIOL 627 *Marine Tetrapod Biology* (4)
   - BIOL 630 *Marine Invertebrate Zoology* (4)
   - BIOL 632 *Ichthyology* (4)
   - BIOL 635 *Marine Botany* (4)
3. At least three units of additional coursework, typically from the following list:
   - BIOL 502 *Special Topics* (1-4) e.g. Coral Reef Ecology, Deep Sea, Biology, Marine Biodiversity
   - BIOL 503 *Special Topics in Ecology* (1-4) e.g. Marine Molecular Ecology, Marine Microbial Ecology, Benthic Ecology
   - BIOL 510 *Field Methods in Marine Ecology* (2)
   - BIOL 614 *Environmental Immunology* (3)
   - BIOL 640 *Applied and Environmental Microbiology* (4)
   - BIOL 641 *Marine Parasitology* (4)
   - BIOL 642 *Aquatic Toxicology* (4)
   - BIOL 643 *Fisheries Science* (3)
   - BIOL 644 *Aquaculture* (3)
4. A minimum of 4 units of thesis credit (BIOL 700 Thesis (1-6) is also required.
5. Attendance at the Fort Johnson Marine Science Seminar Series is expected of all students.

Courses in other College of Charleston programs or other universities can substitute for the requirements #1-3 above if approved by the GPMB's Marine Biology Council.

B. Student Marine Biology Research Colloquium

The goals of the Colloquium are to:
- increase awareness of ongoing marine biological research by GPMB students,
- give students experience with formal scientific presentations, and

• promote interaction among faculty and students.

All GPMB students are required to give both poster and oral presentations at the Colloquium. Posters are presented in the beginning of the second year in the program, whereas oral presentations are given by students just starting their third year. Separate panels of judges provide feedback to students presenting posters and talks. Awards are given for the best poster and oral presentations. Presentations are judged on the basis of: 1) scientific content based on the articulation of the problem, soundness of hypothesis testing, methodologies, and analyses (poster presentations are not judged on results and conclusions in order to provide every opportunity for success for students in early phases of actual research implementation); 2) oral and visual quality of the delivery; and 3) demonstration of confidence and depth of understanding of the material. The awards are presented at the Saturday evening social event (our "lowcountry boil").

A list of abstracts and schedule of events for the 2013 Colloquium can be found at: http://marinebiology.cofc.edu/current-students/student-research-colloquium-/documents/ColloquiumProgram2013.pdf

The two-day event aslo includes an invited speaker who provides a Friday keynote address and a Saturday closing address.

Colloquium Keynote Speakers:

1999 **Dr**. **Ken Tenore** - Chesapeake Biological laboratory,
University of Maryland
2000 **Dr. John Pearse** - Institute of Marine Science,
University of California
2001 **Dr. Lauren Mullineaux** - Woods Hole Oceanographic Institute
2002 **Dr. Larry Crowder** - Duke Marine Laboratory,
Duke University
2003 **Dr**. **Walter Boynton** - Chesapeake Biological Laboratory,
University of Maryland
2004 **Dr. Malcolm Shick** - School of Marine Sciences,
University of Maine
2005 **Dr. Margret Mcfall-Ngai** - Madison Medical School,
University of Wisconsin
2006 **Dr. Jeffery Levinton** - Department of Evolution and Ecology,
State University of New York at Stony Brook
2007 **Dr. Peter Wainwright** - Wainwright Laboratory,
University of California, Davis
2008 **Dr. James T. Carlton** - Williams-Mystic Program,
Williams College
2009 **Dr. Steve Palumbi** - Hopkins Marine Station,
Stanford University
2009 **Dr. Erik Sotka** - College of Charleston & **Dr. Geoff Scott** – Hollings Marine Laboratory

2010 **Dr. Win Watson** - Watson Laboratory,
University of New Hampshire
2011 **Dr. John Bruno** – Department of Marine Sciences,
University of North Carolina
2012 **Dr. Thomas Near** – Department of Ecology and Evolutionary Biology,
Yale University
2013 **Dr. Felicia Coleman** – Coastal and Marine Laboratory,
Florida State University

C. Academic Progress

Students are expected to sustain a reasonable rate of progress throughout the Program, and this progress is closely monitored by the Program Director. No more than 60 days after completion of the first year's core courses, students are expected to have formed a thesis/advisement committee and pass the oral comprehensive examination. Soon after first full year of tenure in the program they must develop a thesis proposal, to be approved and signed off on by their committee and the Program Director. The deadline for the thesis proposal was recently moved from Sept. 1 to Nov. 1 for Fall admits, giving ~14 months to submit an approved thesis. Students whose one-semester GPA, or overall GPA (grade-point average for all graduate level courses combined) falls below 3.0 are automatically placed on academic probation and cannot receive an assistantship through the College of Charleston. Failure to achieve an average of 3.0 in the next semester's work and to raise the cumulative GPA to 3.0 or above upon completion of two semesters of probation will lead to the student being dropped from the Program. A grade of D is not available for graduate students, only A through C, and F. Receipt of an F in any graduate course results in automatic removal from the Program. After successfully passing the comprehensive exam and preparing an approved thesis proposal, the candidate completes, presents and defends his/her thesis. A maximum of four years is permitted to complete the degree and continuous enrollment (except summers) is required. More information about the oral comprehensive exam, thesis proposal, and thesis/thesis defense can be found in the GPMB student handbook (see http://marinebiology.cofc.edu/faculty-resources/by-laws/index.php

http://marinebiology.cofc.edu/about-the-program/index.php).

D. Course Descriptions

All of the content courses taught in the GPMB are also cross-listed for the Masters of Environmental Studies program and are given distinct MES course numbers even though there is just the one course. The GPMB and Biology Department fully fund the MES cross-listings. For example Biol 601, Ecology of Marine Organisms, is also down as EVSS 622. Thus, registrations from the MES program in Marine Biology courses are not reflected in the workload and enrollments reported here for the GPMB.

Biol. 502 Special Topics (1-4)
Special studies designed to supplement regular offerings in the program or to investigate an additional, specific area of marine biological research. Recent Special Topics courses have included Marine Algal and Microbial Biology, Vertebrate Genome Biology, Intro to Genomics, Environmental Microbiology, Landmark Literature in Molecular Evolution, and Field Experience in Biology of Coral Reefs.

BIOL. 503 Special Topics in Ecology (3-4)
Investigation of advanced specific areas of ecology beyond General Ecology (BIOL 341). Examples of offerings may include marine microbial ecology, benthic ecology, community ecology, and population ecology. NOTE: This course may sometimes include a lab, in which the number of credits will be four.

BIOL. 510 Field Methods in Marine Ecology (2)
The use of ecological theory and methods to obtain and interpret experimental data gathered in the local marine environment. Emphasis is placed on an intensive class project. Lecture and laboratory total four hours per week.

BIOL. 600 Physiology and Cell Biology of Marine Organisms (4)
A study of the regulatory mechanisms found in marine organisms especially as these relate to interactions between the organism and the environment. Mechanisms will be discussed at the organismal, organ-system, tissue, and cellular levels. Lectures are three hours per week; laboratory three hours per week.

BIOL. 601 Ecology of Marine Organisms (4)
The study of living organisms in the marine environment - population and community ecology, reproduction and life histories, productivity, evolution, and biogeography. A broad overview of these elements is followed by detailed consideration of major coastal and oceanic ecosystems around the world. Lectures three hours per week; laboratory three hours per week.

BIOL. 610 Physical Oceanography (4)
A study of the physics and chemistry of ocean and estuarine waters, circulation, waves, and tides. Lecture and laboratory work emphasizes the interrelationships of physical, chemical, geological, and biological processes in the sea. Lectures three hours per week; laboratory three hours per week.

BIOL. 611 Biometry (4)
A broad treatment of statistics concentrating on specific statistical techniques used in marine biological research. Topics covered include sampling procedures and analysis of distributions (binomial, poisson, and normal), hypothesis testing and estimation with emphasis on analysis of variance and experimental design (Latin-square, nested, randomized block, factorial), analysis of frequencies, regression, and correlation. Several nonparametric and multivariate methods which are pertinent to research in the marine biological sciences are discussed. Emphasis is on application of statistical techniques and

not toward theory; therefore, a knowledge of mathematics through calculus is expected. Lectures three hours per week; laboratory three hours per week.

BIOL. 614 Environmental Immunology (3)
This course, directed at graduate and advanced undergraduate students, addresses the role of the immune system in maintaining the health of human and wildlife populations. Lectures and independent reading followed by classroom discussion build skills in critical analysis of current literature in immunotoxicology, clinical and comparative immunology.

BIOL. 618 Marine Molecular Ecology (4)
This course is designed to introduce you to genetic tools - which are available, practical, and useful for particular questions - and apply their analyses to marine ecology and evolution. In particular, population genetics, phylogenetics, and molecular evolution will be used to elucidate larval dispersal, historical demography, life history, speciation, and conservation.

BIOL. 619 Biology of Coral Reefs (3)
An introduction to the biology and ecology of reef-building corals and coral reefs. Topics to be covered include coral ecology (nutrition, reproduction, population structure, and distribution), taxonomy and systematics, biogeography and reef-building processes. The course will also cover natural and human induced disturbances on coral reefs and discuss exploitation and coral reef management options.

BIOL. 620, 621 Graduate Core Seminars (1 each)
Seminars on contemporary topics in marine biology acquaint students with the variety of disciplines and techniques available to scientists working in the marine environment. Designed especially to stimulate new-to-the-program students to choose thesis topics. Two hours per week. (620-fall, 621-spring)

BIOL. 627 Marine Tetrapod Biology (4)
This lecture, laboratory, and field course emphasizes both the diversity and common themes of the physiological, behavioral, and anatomical adaptations that characterize certain lineages of reptiles, birds, and mammals that exploit a wide array of marine habitats. Highlighting the faunas of South Carolina, we will evaluate marine tetrapods as models for advanced studies in evolution, physiology, behavior, ecology, and conservation. Prerequisites: Ecology (BIOL 341) or its equivalent and at least one additional advanced biology course such as Genetics or Vertebrate Zoology.

BIOL. 628 Plant Ecology (4)
Plant Ecology will explore the population ecology of plants covering the genetic, spatial, age, and size structure of plant populations. The focus will be on understanding the origin of these different kinds of structures, understanding how these influence each other, and understanding why these change with time. Prerequisite: General Ecology (BIOL 341) or permission of the instructor.

BIOL. 629 Conservation Biology (3)
A course exploring the origin, maintenance, and preservation of biodiversity at all levels: genetic, population, community, ecosystem, and biosphere. The focus will be on applying ecological, genetic, and evolutionary principles to problems of conservation. Optional field trips will make use of the rich biota of the Charleston area. Prerequisites: General Ecology (BIOL 341) and either Genetics (BIOL 311) or Evolution (BIOL 350) or permission of the instructor.

BIOL. 630 Marine Invertebrate Zoology (4)
A study of the functional morphology, life history, systematics, evolution, and other selected aspects of the biology of marine invertebrates. Lectures three hours per week; laboratory three hours per week.

BIOL. 632 Icthyology (4)
A study of the biology of fishes, emphasizing diversity and evolution, morphology, physiology, ecology, life histories, behavior, systematics, and biogeography. Laboratory work will focus on groups important in the local fauna. Lectures three hours per week; laboratory three hours per week.

BIOL. 635 Marine Botany (4)
Introduction to taxonomy, morphology, phylogeny, and ecology of marine plants. Major groups of planktonic and benthic algae and vascular plants from the coast of South Carolina are studied. Lectures three hours per week; laboratory three hours per week.

BIOL. 640 Applied and Environmental Microbiology (4)
A lecture and laboratory study of the special applications of microbiology to domestic water and waste water and solid wastes, food and dairy products, and industrial processes. Includes microbial distribution and its role in various marine and freshwater, terrestrial, animal, and product environments. Lectures three hours per week; laboratory three hours per week.

BIOL. 641 Marine Parasitology (4)
The morphology, life cycles, ecology, physiology, and pathogenic effects of animals parasitic in or on marine hosts are considered. The parasites to be studied include protozoa, helminths, arthropods, and other miscellaneous groups typical of the marine environment. The principles and practice of parasite taxonomy and evaluation, along with morphologic and physiologic studies, are emphasized in the laboratory. Lectures three hours per week; laboratory three hours per week.

BIOL. 643 Fisheries Science (3)
A general introduction to methods of harvesting aquatic resources and collection and evaluation of biological data to effectively manage these resources. Topics include age and growth analysis; mortality, recruitment, and yield; production and early life history; stock assessment techniques; and detailed study of a certain important fisheries. Lectures three hours per week.

BIOL. 644 Aquaculture (3)
Principles and techniques of aquaculture, with emphasis on warm-water species which spend all or part of their lives in salt water. Status and potential of aquaculture, including detailed discussions of established and candidate species. Design and management of aquaculture systems. Importance of water quality, feeding and nutrition, diseases and predators, genetics and breeding, and economic considerations in aquaculture. Lectures three hours per week.

BIOL. 645 Systematic Biology (3)
An in-depth coverage of the principles of systematics with emphasis on reconstruction of relationships and evolutionary history of organisms. Topics include current theories of systematic and evolutionary biology, methods of phylogenetic systematics,and critical evaluation of phylogenetic hypotheses. Prerequisite: At least one upper division course in organismal biology.

BIOL. 646 Aquatic Toxicology (4)
An introduction to assessing the effects of toxic substances on aquatic organisms and ecosystems. Topics include general principles of toxicology, fate and transport models, quantitative structure-activity relationships, single-species and community-level toxicity measures, regulatory issues, and career opportunities. Examples are drawn from marine, freshwater and brackish-water systems. Lectures three hours per week.

BIOL. 650 Seminar in Marine Biology (1)
A seminar covering topics in marine biology, fisheries and aquaculture, marine biomedical science, and coastal ecology. Total semester hours in BIOL 650 is normally limited to 3. Does not satisfy elective unit requirement. (fall and spring)

BIOL. 690 Independent Study (1-4)
An individual directed study of issues or topics in an area of marine science. The topic and project outline must be approved by the thesis committee and the program director. Repeatable up to six semester hours toward graduation.

BIOL. 700 Thesis (1-4)
Individual thesis research in marine biology. No more than 4 semester hours of thesis credit may be counted toward fulfilling the minimum degree requirements.

Numbers of GPMB courses and students enrolled between 2007 and 2013 are illustrated below in Charts VI-1 and VI-2.

Chart VI-1

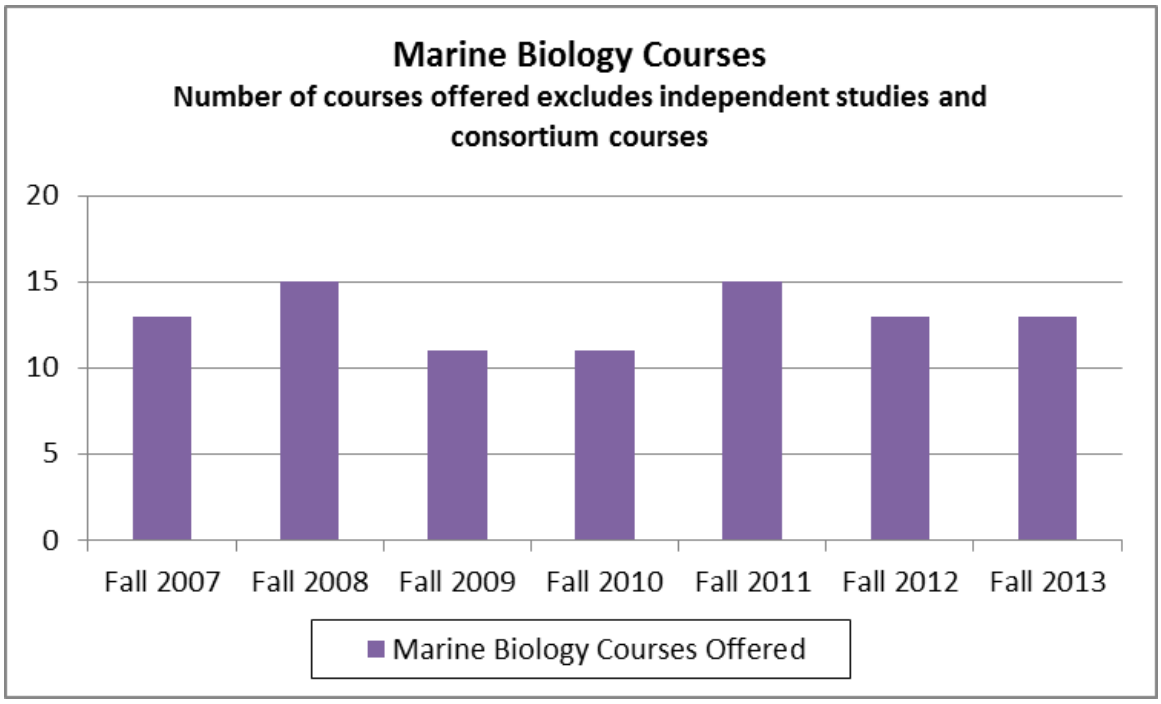
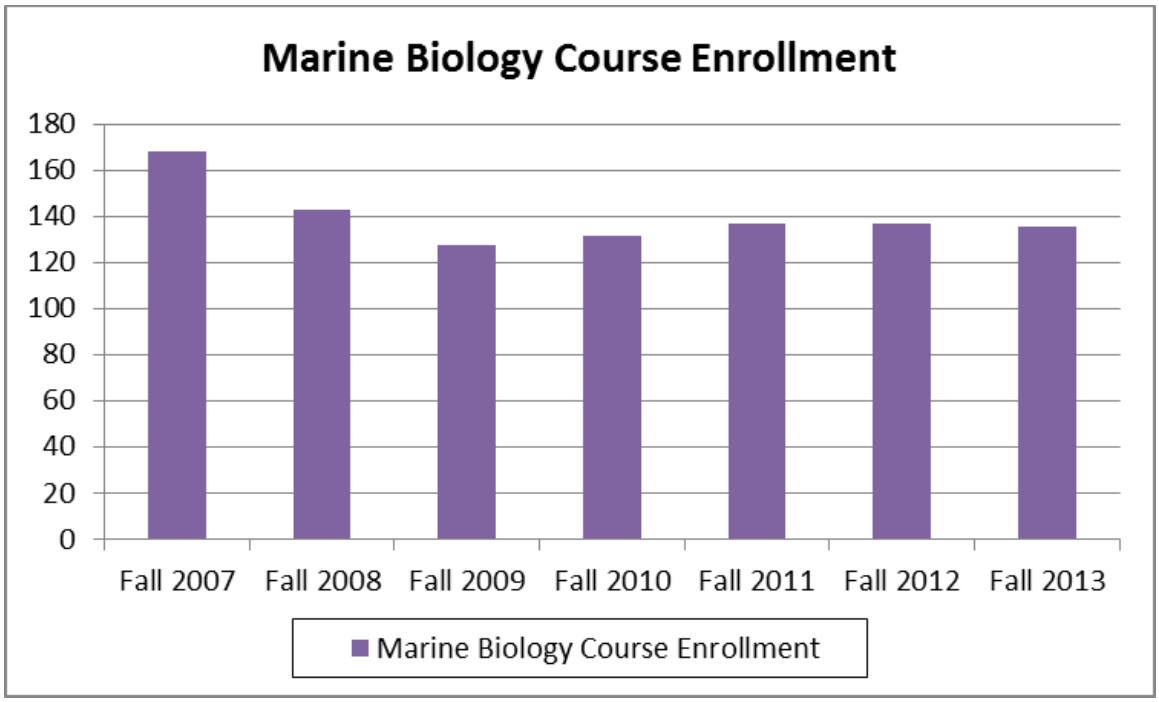


Chart VI-2

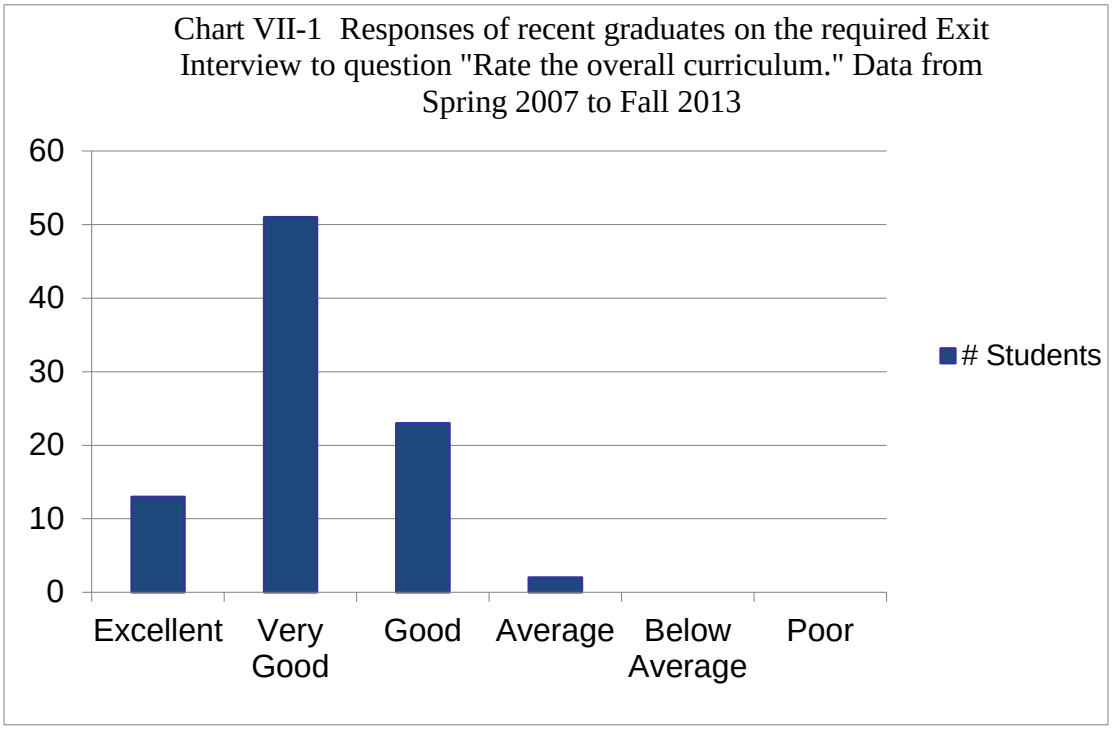


VII. PROGRAMMATIC CLIMATE

A. Student Faculty Satisfaction

Based on input from current students and faculty, regularly scheduled faculty meetings, required exit interviews with every student, and alumni interviews, the Director of the Graduate Program in Marine Biology assesses, on an ongoing basis, overall satisfaction with the Program. Graduate students are asked several questions on the required exit interviews (see Appendix 2). They are asked "What are the strengths of the Marine Biology Program?" "What are the weaknesses?" and "Rate the overall curriculum." from a scale of "Excellent, Very Good, Good, Average, Below Average and Poor." Students consistently express their feeling of obtaining a broad, yet in-depth exposure to marine biology (Chart VII-1).

Chart VII-1 Responses of recent graduates on the required Exit Interview to question "Rate the overall curriculum." Data from Spring 2007 to Fall 2013



The three greatest strengths usually noted by graduate exit interviews, and by post-graduates in follow-up interviews are: (1) the cooperative nature of the program (i.e., the resources provided to the Program by its location and cooperative agreements with collaborating institutions at the Fort Johnson Marine Science Center), (2) the large research faculty including adjunct faculty available for advisement and support, (3) the opportunity to come in to the program without a predetermined primary advisor. In addition, students show tremendous gratitude for research and travel support funding provided by the College of Charleston and our Fort Johnson partners. Occasional follow-up interviews with students who have been out of the Program for 2-5 years indicate that general satisfaction with the program is quite high. This apparent satisfaction is

supported by the high level of participation (more than 23% of all students and alumni) in the reunion of all classes held at the 40th anniversary of the program in 2013.

On the negative side we do hear from current students that the stipend levels provided by College of Charleston and DNR for graduate student assistantships are not adequate for the high cost of living in Charleston. Students are eligible for an out-of-state tuition waiver (abatement) if they are on assistantship or scholarship with College of Charleston; however, there are no in-state tuition waivers and no insurance or other employment benefits provided for College of Charleston graduate students. Consequently, many students receive Financial Aid. For instance, in 2013 a majority (over 80%) [42 out of 50 total students] received Financial Aid in some form, with 28% [14 out of 50 total students] taking out at least one student loan.

Faculty satisfaction is also strong. Some minor complaints are occasionally heard, usually regarding the lack of attention being given to a particular faculty member's area of expertise, and this is often met by offering seminars or special topics courses involving the concerned faculty member. Overall there is little indication of student or faculty dissatisfaction with the Program.

B. Quality of Advisement

Although advisement is very good, there is always room for improvement. Students are officially advised by the Program Director until they have selected a thesis advisor, at which time the thesis advisor and thesis committee become the student's primary advisor(s). The students must then fill out and get approval for an official Plan of Study. The Plan of Study is meant to guide the student during each semester in the Program as to coursework and research goals. The Plan of Study is filed at the College of Charleston's Graduate School Office and before approval for graduation is given, it must be shown to have been satisfactorily met.

The inter-institutional nature of the Program lends strength to the advisement process, particularly in the variety of views that the student's thesis committee can bring to thesis planning and execution. Having a thesis committee made up of faculty from the College of Charleston, a state research agency (SCDNR), a federal research agency (NOAA) and elsewhere, leads to more realistic results and a more dynamic advisement setting than would be possible with a committee composed solely of college faculty. As a check, the Program Director must approve all thesis committees, all thesis proposals and all plans of study. In this role, the Program Director has oversight on every student's progress and thesis planning. In addition, the Program Director, through the Administrative Coordinator, checks every student's file for academic progress each semester and schedules regular meetings with all students throughout their tenure in the Program. Another advantage of the inter-institutional thesis/advisement committees is that it results in students making valuable connections at various agencies and organizations both in and out of South Carolina. These connections frequently lead to professional positions upon graduation.

C. Time to Completion

The time it was taking GPMB students to complete their program was a serious concern when the prior program director (Dr. David Owens) was hired to become Program Director in 1999. Several programmatic modifications were adopted to attempt to correct this situation. First the College's normal 5-year limit on time to complete MS degree requirements was reduced to 4 years for the GPMB. In addition, a foreign language skill requirement for MS students was eliminated and new time requirements for Oral exams (July 1st of first year) and Proposals (end of first full year) were implemented and are now closely monitored. The initiation of several additional graduate fellowships has also meant that students have been better able to stay on task in recent yeas with thesis preparation etc. instead of having to take jobs outside of the Fort Johnson Marine Science Complex. Additional smaller steps have been initiated since the last review (2007). These include stronger and earlier (by the end of their first semester) encouragement for students to choose an advisor and thesis topic, workshops and added training on applying for external funding, and the addition of a "first-year feedback" event. The latter is a new weekend event, in which the first-year students present their intial research plans to GPMB students and faculty for early feedback. This event was first held in 2013 and after the spring (April) 2014 event will be assessed through faculty and student polls. If deemed successful, the event will become a permanent fixture and likely will allow deletion of the extant second-semester evening seminar course (Biol. 621), potentially freeing up more time for students to prepare thesis proposals and start their research projects earlier. Chart VII-2 illustrates temporal trends in GPMB time-to-completion since 2000, and Chart VII-3 shows how the GPMB compares to other College of Charleston masters programs.

Chart VII-2

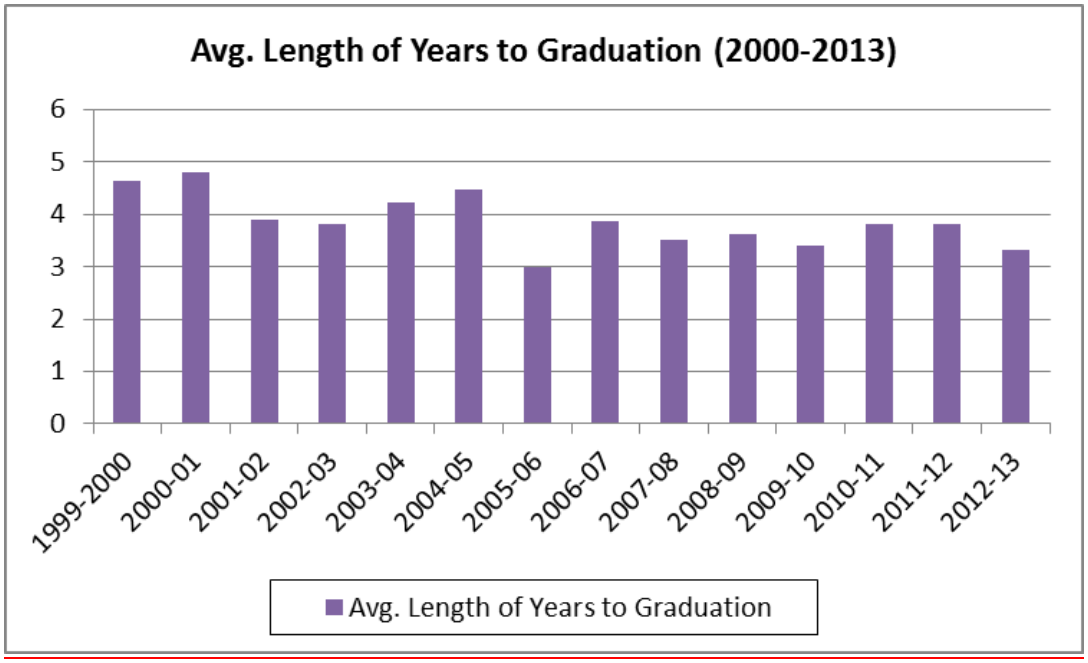


Chart VII-3. Years to gradaute by College of Charleston graduate program.

Major	Degree	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Accounting	MS	1.88	1.68	1.85	1.66	1.68	1.82	1.38
Business Administration	MBA						1.5	1.5
Communication	MA		1.75	1.79	1.92	2.3	2.1	2.69
Comp and Info Systems	MS	2.77	2.75	3.38	2.28	2.63	2.43	3.31
Early Childhood Education	MAT	2.61	2.65	2	2.22	2.26	2.54	2.32
Early Childhood Education	MED	3.21	3.33					
Elementary Education	MAT	2.37	2.19	2.44	2.7	2.44	2.33	2.4
Elementary Education	MED		5	3.5				
English	MA	2.42	2.27	2.38	2.47	2.35	2.25	2.5
Environmental Science	MS	2.78	3.07	3	3.15	3.3	3.19	3.21
History	MA	2.71	2.71	2.23	2.5	3.11	2.57	2.79
Interpreting	MA	4	2.5	4.5	1.5	1.5		
Languages	MED	3.22	2.88	3.94	3.06	3.58	4	4.15
Marine Biology	**MS**	**3.86**	**3.5**	**3.61**	**3.39**	**3.82**	**3.81**	**3.32**
Mathematics	MS	2.68	2.06	1.75	2.38	1.25	2.06	2
Middle Level Education	MAT							1.5
Performing Arts Education	MAT			2	3		3	2.42
Public Administration	MPA	2.21	2.53	2.7	2.35	2.14	2.52	2.59
Sci/Math for Teachers	MED	2.63	3.83	2.5	2.88	2.83	2.9	4
Special Education	MAT	2.42	2.2	2.94	2.19	2.06	1.88	2.5
Special Education	MED	4	2.83	2.5		4.5		
Teaching, Learning and Advocacy	MED					1.5	1.7	2.5
Total		**2.67**	**2.58**	**2.57**	**2.43**	**2.53**	**2.38**	**2.47**

C. Student Community and Outreach

Graduates of the GPMB generally express that a strong sense of community is a major programmatic strength. Because the vast majority of our students enter the program together in Fall semester, and also take the same core courses over the first two semesters, strong bonds are formed among students, especially within individual cohorts. In addition, it is rare to have part-time or commuter students in the program, therefore graduate school is a shared experience for the vast majority of GPMB students. The chief organizing unit for GPMB student activities is the Marine Biology Graduate Student Association (MBGSA). The MBGSA is the student government of GPMB students and supports three main functions: 1) provide a foundation for student communication and involvement within the GPMB (e.g., through student representation on most of the GPMB standing committees), 2) connect the GPMB students to the larger College of Charleston graduate student body through liaisons to the Graduate Student Association (GSA), and 3) plan social events and community outreach projects. Examples of the latter include Beach Sweep, Adopt-A-Highway, Habitat for Humanity workdays, and the Folly Beach Christmas Parade. In 2011, the MBGSA held the first annual "Marine-ival," a spring carnival that provides food, fun, and education for GPMB students, faculty, alum and their families. The MBGSA also assists with the TGIF social after our weekly Friday Fort Johnson seminars, organizes thesis defense celebrations, and organizes student help during the GPMB's Student Research Colloquium.

VIII. PROGRAM ASSESSMENT

A. 2007 External Review and Responses

The last comprehensive review of the GPMB was conducted in 2007. The review included an external review team consisting of Drs. Robert R. Christian (East Carolina University) and Richard T. Di Giulio (Duke Univeristy). Their full (12-page) report is available upon request. Their executive summary and recommendations are reproduced below:

Executive Summary

We were asked by Dr. Amy Thompson McCandless, Interim Dean of The Graduate School and Associate Provost for Research to conduct an external review of the College of Charleston Graduate Program in Marine Biology (GPMB) during spring 2007. We have read the Program's internal review document and other materials provided; interviewed faculty, students and administrators; and visited facilities to assess the Program's context, strengths and challenges. We provide recommendations for programmatic improvement based upon this assessment. Everyone was most helpful and friendly, making our efforts as pleasurable and efficient as possible.

The caliber of the GPMB and its students and faculty is excellent. It should be and generally is considered a "jewel in the crown" of College of Charleston. The Program has the strong endorsement of the two Deans who have jurisdiction over it. The Program's success depends largely, however, on the partnerships with other organizations and access to their facilities, faculty and resources. The new joint initiative in Marine Genomics is an indication of how the partnership benefits the Program. In fact the 55 students of the Program could not accomplish their research in the combined facilities of the Grice Marine Laboratory and Biology Department. Many use the facilities of the Hollings Marine Laboratory and the other partners. The enhancements and renovations to the Grice Marine Laboratory will improve facilities available directly through the College.

While the GPMB is clearly excelling as a Master of Science program in marine biology, it faces a number of challenges that must be addressed for it to reach its full potential. These include uncertainties associated with its location at an undergraduate-oriented institution, financial issues with attracting and nurturing the very best graduate students in the field, communication, and academia (curricular and research).

Our recommendations focus on the following issues: (1) expanded communication within and beyond the College community of the value of the Program; (2) improved financial condition and status for graduate students; (3) more aggressive solicitation of funding and appropriate distribution of funds for the Program; (4) need for increased diversity; (5) reevaluation of core curriculum; (6) re-design of graduate student orientation; (7) better communication with adjunct faculty and strategies for better integration of them; (8) careful monitoring and control of time to graduation. Finally, we wish to make clear that these recommendations are designed to make better an already excellent program.

The team also made specific recommendation s for improvement to which the GPMB Director and GSO responded in December 2007.

Recommendations & Response

The GPMB and Graduate School Office (GSO) were required to respond to these recommendations. These 2007 responses are included below (in blue). Updates also follow these responses where applicable (in green).

1. *Careful consideration should be given to approaches for communicating to the broad College community, as well as other communities (local and state) the unique aspects of the GPMB that make it highly valuable to the College, Charleston, and the State. This might include communicating the fit of the Program with the natural environment of Charleston, and the related potential sources of support that are not in competition with other College programs. Evidence of the success of such communication is the Marine Genomics initiative.*

One of the goals of the Graduate School for 2007 – 2008 has been "To increase the visibility of the Graduate School (GSO), its programs, faculty and students and of the

Office of Research and Grants Administration (ORGA) and other research opportunities." This has been accomplished by revising the GSO web site to highlight graduate student and faculty accomplishments, updating the Academic Affairs web site to include references to opportunities for graduate students and faculty, working with the Office of Research Administration and Grants (ORGA) to hold workshops on grant writing and funding opportunities, instituting RCR workshops for all graduate students, introducing "Lunch with the Dean" (monthly gatherings of graduate students chosen randomly from all programs), creating a Graduate Student Association separate from the undergraduate Student Government Association, bringing materials on College programs to Council of Graduate Schools' conferences and workshops, and inviting graduate alumni to alumni events in Greenville, Washington, D.C., and Atlanta and sharing graduate materials with them. Although none of these GSO efforts targets Marine Biology specifically, all have promoted the special nature of the program's location in the South Carolina Lowcountry.

In Fall 2007, the new Marine Biology Program Director (Plante) attended two Graduate Education Fairs with the Graduate School recruiter to promote the Marine Biology program, its faculty and the location. He not only met with students at the fairs, but also met with faculty and students before and after the fair to further the promotion of our program. Many prospects of the program are automatically interested in the location of the program, but both the GSO recruiter and the program director have made a concerted effort to educate the prospects of the expansive adjunct faculty available, the array of research areas available, and the new initiative in marine genomics. These valuable elements are included in every piece of communication the GSO has with a prospect, and are also scheduled to be included in future literature published by the GSO, such as the brochure for the 2008 – 2009 academic year.

In addition, the GPMB web site has been entirely revamped. The new site is much more user-friendly and visibly appealing. New areas of distinction, specifically the marine genomics initiative, have been highlighted.

Update: The new branding strategy of the College required that department and program website conform to a uniform appearance and format, therefore the website has since undergone yet another overhaul. The new website migration, which was completed in August 2013, resulted in many, many problems (broken links, outdated material, incorrect information, etc.). Although we still find an occasional issue, for the most part the necessary corections have been made. Recent discussions about initiating select Ph.D. at the College have put the GPMB in the spotlight at the college level and beyond. The GPMB has been targeted by the administration as the trial doctoral program; however, some resistance among faculty remains. Discussions at departmental and institutional levels continue.

2. *Reduced tuition costs and/or increased funding for students in the Program should be a high priority. Of immediate concern here appears to be impending legislation to reduce out of state tuition waivers. It is critical that College administrators do everything in their power to inform those deciding on this*

legislation of the negative impacts this will have on graduate education in the state. The College should also devise a means to provide graduate students, particularly those employed as teaching or research assistants, with health insurance, or at least facilitate their ability to obtain reasonably priced insurance. These steps go hand in hand with a general improvement of the status of graduate students within the College. Their role as teachers and budding researchers should be acknowledged as different from undergraduates.

Another GSO goal is "To increase research opportunities and funding for scholarships, assistantships, and professional development." The major accomplishment was a $2000 increase in academic year stipends for graduate and teaching assistants. In Spring 2007, graduate student research and presentation grants were introduced, funded by indirect costs of Hunley Project and by Graduate Studies Foundation account moneys. In addition to these research and presentation grants, these funds were also used to give cash awards for the best poster from each School at the Annual Graduate Research Poster Session. Winners were photographed with their posters and these pictures were circulated to faculty, staff, and students over email and posted to the GSO web site.

The new Graduate Student Association (GSA), chartered in June 2007, has created a Student Welfare Committee to work on issues such as parking and health care. They have met with the Faculty Welfare Committee to see about putting adjuncts and graduate students in the same pool in order to reduce the costs of the policies available to both groups. The GSA has also met with Auxiliary Services to discuss shuttle transportation between Grice and the downtown campus that would alleviate the need for students to find and pay for parking while attending class or teaching labs on the peninsula.

Update: The bulk of student support comes through teaching assistantships (TAs), with additional support provided by fellowships, RAs and GAs. In 2010, the GPMB director worked with the GSO to get TA stipends for our students (and for all STEM grad students at CofC) increased from $6650 to $8000/semester (20% increase). All RAs have not risen to the $8000 level, but they are increasing as new grants get funded so that the norm should soon reach $8000/semester as well. There have been several tuition increases since 2007 (currently in-state tuition is $469/cr.) to partially offset these gains in stipend level. Over the past seven years, some external support has been lost (e.g., NOAA funds earmarked for RAs have gone away). Fortunately we have been able to balance those losses through increased DNR support (RAs and hourly positions) and more external fellowships (e.g., NSF-GRFP). In 2009, due to enrollment increases in other graduate programs, the availability of abatements (out-of-state tuition waivers) for graduate students, including GPMB students, was imperiled. However, additional monies were found to augment the abatement money pool such that all GPMB students with assistantships or fellowships again had access. Continued increase in demand for abatement monies has meant that the pool generally dries up in mid-year. Therefore, although extant students and those matriculating in Fall generally can obtain abatements, we have turned away or deferred spring admits for lack of abatements. No substantial changes have occurred with respect to student insurance.

3. *On the funding side, administrators and faculty should aggressively seek new funding opportunities for the Program, including research and training grants, foundation support, corporate support, and individual donors. Additionally, the current approach taken by the College for the distribution of overhead funds on faculty research grants should be examined to insure that a significant portion is returned to the Program for student support. Some of these funds might be channeled to more discretionary funds for the Director to foster student recruitment and success.*

It is recognized that increased funding would benefit the program in a number of ways, including recruiting, student debt, and reducing the average time to graduation. We have begun efforts at all administrative levels to address the funding issue. The Graduate School Dean has put forward a proposal for the next fiscal year, which, if approved, would help in this area. The request is to amend the formula which calculates the budget for abatements so that the formula would be based on 72 full-time students rather than the present 60, representing a 20% increase. ***The Graduate School will also be asking for a regular budget line for graduate student research in its FY 09 requests.***

At the programmatic level, the Director has charged the GPMB Funding and Cooperative Research Committee with identifying and compiling external sources of research funding that would be appropriate for M.S.-level marine science students. The committee continues to work on this, and to date they have identified 24 sources, which are advertised to students on the GPMB web site. This has already borne some fruit, as 2 of our 15 first-year students have submitted applications for this type of national/international competition (i.e., one for EPA STAR, and one Fulbright). We continue to work with Laurie Chamness and the Office of Research and Grants to identify sources of funding graduate student research.

Update: We have inserted additional modules in first-year seminar courses and conducted workshops to encourage incoming and early GPMB students to compete for large external graduate fellowships. Applications for such awards have increased, e.g. 2-4 each year for the NSF-GRFP. Our students continue to have success with familiar national competitions (e.g., 6 Knauss Fellowships since 2007) and have begun to have success with some new awards (e.g., a Fulbright, NSF-GRFP, National Geographic Young Explorers Award, PADI).

4. *The GPMB should make every reasonable effort to increase diversity of its student body, and likely its faculty as well. Approaches for the former that have been successful at other institutions include recruiting trips to historically black colleges, inviting faculty and students from these colleges to visit (perhaps at the Program's highly praised annual symposium), and establishing formal academic relationships with neighboring historically black colleges.*

Recruitment of minority students continues to be a significant issue for the Program. In an attempt to increase the number of minority applicants, the GPMB Director has

stepped up recruiting efforts primarily through visits to local colleges. In Fall 2007, this has included participation in Graduate School fairs for Presbyterian College, Erskine College, College of Charleston, and Savannah State University (SSU). In addition, we have tried to establish a reciprocal partnership with SSU, an HBCU located in Savannah, Georgia. The GPMB Director visited with 3 SSU Marine Science faculty (including Matt Gilligan, Program Coordinator, Marine Sciences), and spoke about the GPMB to a senior seminar class. Talks are underway to determine how to bring a SSU class group to visit the Grice Marine Laboratory (GML). This likely will occur in Spring 2008, ideally during the GPMB Graduate Student Colloquium. We also hope that our close association with the Grice lab's NSF-funded REU program will contribute to a more diverse applicant pool. Minority involvement in the REU has increased significantly over the past 3-5 years, in part due to a new "bridging program" with the College's SCAMP (South Carolina Alliance for Minority Participation) program. The GPMB typically gets several applicants per year from former GML REU participants, and admits 1-2 per year.

The School of Sciences and Mathematics as well as the College continue to focus on increasing the diversity of the faculty. SSM Department chairs and search committees have standing mandates to personally reach out to institutions that are known for producing minority Ph.D.s. and to professional organizations that have a large membership of minority scientists.

Update: Minority recruitment continues to be a signififnat challenge. Although we expended considerable rsources in 2007-2009 visiting HCBUs and attending grad school fairs to recruit minority applicants, no success was apparent from these efforts. The GML's REU program continues to be our best recruitment tool for these populations. In addition, two other summer internship programs administered by our partners (SC-DNR's MIMES (Minorities in Marine and Environmental Sciences) program and MUSC's SURP (Summer Undergraduate Research Program)) are potential applicant sources. The GPMB director and several GML faculty members participate in these programs annually. Unfortunately, competition for qualified minority applicants is intense, and our limited resources make it difficult to compete with other programs (e.g., a minority applicant in 2013 turned us down to attend a doctoral program at Brown University).

5. *A joint faculty/student committee should be established to evaluate the core curriculum, content, usefulness and instructor effectiveness of existing courses, emerging course needs, procedures for substitutions of required courses, and special "modules" for skills such as oral presentations and proposal-writing.*

The GPMB Director has charged the GPMB Curriculum and Academic Planning Committee to review the GPMB core curriculum (specifically, the four courses that constitute the core: "Physiology and Cell Biology of Marine Organisms," "Ecology of Marine Organisms," "Physical Oceanography," and "Biometry"). This committee consists of eight GPMB faculty and one GPMB student representative. The CAP Committee will perform this review over two years, with "Physiology and Cell Biology of

Marine Organisms" and "Biometry" to be reviewed during the 2007-2008 academic year, and "Ecology of Marine Organisms" and "Physical Oceanography" reviewed during the 2008-2009 academic year. The Committee will evaluate the four courses individually, but also take a holistic look at the core curriculum.

Substitutions for required courses have been rare in the past. In general this has occurred when a student had previously taken a course very similar to one of our core courses. Procedures are in place for substituting prior courses for GPMB core requirements (i.e., review by GPMB Director and Marine Biology Council), although awareness of this option may have been limited. During the evening seminars for first-year students (Biol. 620 and 621), the Director has endeavored to make the students more aware of this option. To date, no students in the incoming class have inquired about opting out of one of the cores.

The 620 and 621 seminar courses are undergoing modification with the change in directorship (the GPMB Director leads these courses). With regard to proposal writing and presentations, these seminars provide a portion of the students' training in these areas. There is a module on proposal writing in Biology 620, and a module on poster presentations in 621. The latter is meant to complement the training on oral presentations that Dr. Lou Burnett provides as part of his core course, "Physiology and Cell Biology of Marine Organisms." Students also orally present their anticipated thesis research project during their second semester in Biology 621. There also are additional requirements for proposal writing within the core curriculum (e.g., in "Ecology of Marine Organisms" in 2005 and 2006, and in "Physical Oceanography" this year). Throughout tenure in the GPMB, students are encouraged to present their research in a public forum. For instance, all second-year students are expected to present their work at the GPMB Graduate Student Research Colloquium. The Annual Graduate Research Poster Session provides another opportunity for GPMB students (5-10/yr) to publically present their research results. In addition, the majority of our students present posters and/or oral papers at national/international disciplinary meetings.

Update: The CAP committee completed the individual reviews of the four core courses between 2008 and 2010. All four courses were determined to be relevant and well-taught overall, although specific suggestions for improvement were provided to instructors of all four courses. Duirng the 2010-2011 and 2011-2012 academic years the CAP committee reviewed the overall structure of the curriculum with two central goals: 1) examine the effectiveness of the GPMB curriculum, with emphasis on the core requirements, and 2) consider the timing of GPMB requirements, especially as they relate to time-to-graduation. Their review consisted of a comparison of GPMB curriculum requirements to those of 52 peer institutions and extensive online surveys of faculty, current student, and alumni satisfaction with various aspects of the curriculum. Their entire 63-page report is available upon request. To summarize their major findings:

1. Course requirements in the GPMB, in terms of the number of credits and core courses required, are similar to those in peer programs.

2. Although there was no regular set of courses in peer programs, the collection of core courses of the GPMB seemed to provide broader coverage than many others (for example, requiring biometry and some aspect of organismal, population, and ecosystem processes). The committee considered this well-rounded coverage a strength for a Master's level program.

3. There was support among faculty and students to increase flexibility of the curriculum.

In addition to suggestions regarding specific courses, the committee's major recommendations are summarized below:

1. Consolidate the two first-year seminar (Biol. 620 and 621), freeing up more time for student's to focus on research projects.

2. Increase encouragement of students to "opt out" of core coursesfor which they already have sufficient background from prior coursework or experience.

3. Develop a broader array of electives and topical seminars.

4. Permanently move the thesis proposal deadline to November 1 (from Sept. 1) of second year (to ~ 14 months into the program) and integrate the thesis proposal into a timeline of events to strengthen the development of the proposal and keep it on track. Those events are illustrated below:

Recommendations #1 and 4 are linked in that prior to 2013 students gave 30-minute informal pre-proposal presentations (incl. Q&A) in the Biol. 621 seminar. On an experimental basis, those presentations in 2013 were moved to a weekend "mini-colloquium" (a.k.a. "First-Year Feedback"). This will be tweeaked and tried again in Spring 2014, then assessed by the CAP committee through surveys. If successful, the plan is to make the "First-Year Feedback" a permanent event, then delete the Biol. 621 seminar course (consolidating the remainder of that seminar into the Biol. 620 Fall seminar course).

2. *With student involvement, orientation should be re-designed to meet the perceived needs of entering students.*

The GSO has revised its orientation so that new graduate students are provided with the opportunity to acquaint themselves to the downtown campus with the help of a private guided tour of both the campus and the downtown library. The Graduate School encourages interdisciplinary collaboration between its departments and its students, and thus worked with the newly established Graduate Student Association to host the inaugural meet-and-greet following orientation. For the two hours after orientation, students used the opportunity to meet fellow students in their degree program as well as students in other programs. The monthly "Lunch with the Dean" sessions are another opportunity for Marine Biology students to meet informally with the dean and with students from other graduate programs.

In addition, at the request of the GPMB staff, the Marine Biology Graduate Student Association (MBGSA) initiated a new orientation component in which extant students take the incoming students downtown for an orientation to the central campus (e.g., bring them to the GSO, Biology Dept. office, help them get student IDs and deal with parking) and the city of Charleston. This has been facilitated by a new (since 2006) "buddy system," which pairs all incoming students with an extant GPMB student for communication and assistance during the summer prior to the arrival of these new students in Charleston.

Update: In addition to the above, the extant GPMB students now put on a New Student Welcome Social (pizza party) for the new students. The GSO has altered their orientation substantially. The former series of lectures has been replaced with a "meet-and-greet" social along with readings with most of the relevant orientation information. Incoming students must sign dcouments confirming that thay have read the printed materials.

3. *Strategies should be developed to integrate better the adjunct faculty into the Program, beyond their roles as research mentors. Under this recommendation are included strategies for insuring that program requirements are fully understood and communicated by all; that the nature and scope of appropriate thesis projects are stated, agreed upon and monitored; and for increasing a sense of community between core and adjunct faculty. This might include more shared teaching of courses between core and adjunct faculty, and greater recompense for teaching by adjunct faculty. With this should be a reevaluation of stipends for teaching by adjunct faculty to determine if they are adequate and appropriate to attract the best teaching by them.*

Currently adjuncts are involved in mentoring graduate research projects, teaching courses, and committee service. Level of involvement varies widely, as would be expected among ~80 adjunct faculty, many of whom are on the Fort Johnson campus, whereas others are based as far away as Coastal Carolina University. In addition to the involvement of adjuncts in course teaching, regular standing committees, and on theses

committees, several events are employed to foster a sense of community. These include semi-annual faculty meetings, the Graduate Student Research Colloquium, and two major social events (New Student Social after Fall faculty meeting and cook-out following the Colloquium). There is also a Fort Johnson Seminar series, which is followed by an MBGSA-administered TGIF. None of these events are new, and it is felt that this number of events should be sufficient to build community within the Program. However, attendance at these events can be improved. The time of the weekly seminar has been moved (from 4 PM to 3 PM on Friday) as an experimental effort to increase attendance. The GPMB Director has also used the Spring and Fall faculty meetings to advertise and encourage better attendance at the Colloquium, and the Colloquium Committee has carefully scheduled this year's event so as not to coincide with any major disciplinary meetings, in the hope that Colloquium attendance will improve.

One of the most significant problems resulting from lack of communication and community is perceived to be the diversity in scope and nature of thesis projects. The GPMB Director has communicated this issue to the full faculty at both the Spring and Fall 2007 meetings. He has reiterated that the strategic plan is for students to finish in "three years or less," and has asked all faculty to think about and discuss this issue. The Marine Biology Council was also asked to consider this issue. After rejecting the idea of requiring College of Charleston faculty on all thesis committees, the Council brought a motion to the full faculty that would require that all thesis proposals pass through a sub-set of the Marine Biology Council for approval. This motion was rejected by the faculty. It was made apparent that many thought that this approval, beyond that of the student's thesis committee and GPMB Director, was unnecessary. Despite this outcome, it is hoped that the increased attention that this matter has received of late will in itself force all faculty to be more cognizant of this issue when formulating research plans. In an effort to get students to give more attention to this issue, first year students are now asked to present their thesis research plans orally (in Spring core seminar, Biology 621), which is followed by fellow student and GPMB Director critiques (with consideration of project scope and nature a major component of these critiques). The Director has also begun to require more diversity, both in regard to discipline as well as laboratory affiliation, among students' thesis committees. One frequent criticism has been that certain types of projects, from particular labs, consistently lack scientific rigor relative to the accepted norm for the Program (e.g., "cookie-cutter" fish life history projects and toxicology projects that involve analysis of archived samples, with little student input to experimental design or field collection). It is hoped that this can be avoided with more diverse representation on thesis committees. Students also are now required to include an explicit timeline in their thesis proposals. Other strategies are being employed to address those theses that are specifically too great in scope (see recommendation #8 below).

Adjunct faculty members continue to instruct a significant portion of the GPMB's courses (e.g., 3 of 8 Biology 6XX courses for Spring 2008 will be instructed by adjuncts). The GPMB Director broached the issue of adjunct salaries with the GPMB Curriculum and Academic Planning Committee. They gathered adjunct salary rates for other SC institutions (The Citadel and USC) for comparison, and these rates were forwarded to the

SSM Dean. The GPMB Director and The SSM Dean are in discussions about improving and standardizing the salary rates for adjuncts that teach graduate-level courses for the GPMB.

Update: Since 2007, the Colloquium has been moved to Fall. The New Student Social now follows that event. Another social event, "Marine-ival" originated in 2011 to replace the spring social event that previously accompanied the Colloquium. The experiment with the 3:00 PM Fort Johnson seminars was not well received, so it has returned to the former time slot of 4:00-5:00 on Fridays. At the request of the Academic Affairs office, a formal policy regarding salaries for GPMB (and MES) adjuncts teaching graduate courses has been adopted. For one-credit seminar courses, the stipend is $1750. Three-credit courses pay $4000 for single-instructor courses or $5000 for multiple-instructor courses (to be split among instructors). Although these salaries are low relative to roster faculty compensation, and perhaps low compared to other institutions, they are significantly higher than the College pays adjuncts that instruct our undergraduate courses.

4. *Careful monitoring and control of time required to graduation is needed. Was the three years observed for the last graduating class a blip or indicative of a real trend? A time span of two to three years seems a reasonable goal to seek.*

The two major ways we are attacking this problem is through greater communication about research expectations and stricter enforcement of thesis proposal deadlines. We have applied more pressure (e.g., via e-mail reminders to students and thesis committee members about the drive to submit proposals in a timely fashion, requirements for added paperwork when extensions are requested, and required progress reports for late proposals) to students to get their thesis proposals submitted (by ~ 1 year into their tenure). Although there are numerous reasons for thesis projects to take longer than expected, one relatively easy issue to address is to catch any overly ambitious thesis proposals early on, and require a more realistic project proposal when necessary. The Marine Biology Council discussed ways to address the problem of high variability in the scope of theses. The Council proposed that each proposal pass through an evaluation committee (to be made up of 3-person subset of the Marine Biology Council) for approval. However, the GPMB faculty voted down this move at the September meeting. Greater efforts have been made to convey the strategic plan of graduating students in three years or less (e.g., by the Director at the Spring and Fall GPMB all-faulty meetings). It is expected that improved funding (see #3 above) will also help in reducing the average time to graduation. The Graduate Student Research and Presentation Grants through the GSO have also helped students support their research. Another tactic has been to communicate more effectively the option of opting out of certain courses (especially core courses) if these courses are largely redundant with students' prior courses.

Update: Most recent calculations for time-to-completion suggest that the approximately three-year average was not an anomaly. However, little additional progress to further shorten the time to graduate has been realized despite diverse efforts. The most recent

effort will follow the CAP committee recommendations (see #5 above). Potentially, this experiment could 1) reduce coursework by eliminating one seminar course (Biol. 621), 2) encourage earlier advisor selection and project planning through the "First-Year Feedback" mini-colloquium, and 3) help students complete their formal thesis proposal earlier.

B. New College of Charleston Assessment Plans

In 2011, the College instituted a new assessment protocol to satisfy accreditation requirements of the Southern Association of Colleges and Schools (SACS) and to align programs with the new Strategic Plan. Departmental and program assessment plans were to employ a standard template and, in the beginning at least, were to be simple and generate quantifiable data that could be used to measure learning outcomes and improve student learning. Assessment plans are due annually in September, with reports due the following May. In brief, the GPMB's initial plan of assessment in 2011 was to employ our extant oral comprehensive exam and student research colloquium to assess two main program goals:

1. Broad Knowledge: Acquire broad knowledge in marine biology and related sciences,

2. Communication: Demonstrate ability to clearly and effectively communicate scientific results.

As an example, the May 2013 report provides more detail about the program goals, assessment methods, and assessment results (Appx. 3). Subsequently, in September 2013 the GPMB added a third goal (Appx. 4):

3. Thesis: Students in the program should conduct important and novel research, striving to contribute to the foundation of knowledge through publication in peer-reviewed journals.

Plans and reports are now submitted electronically through ComplianceAssist! Appendix 4 contains this new part of the plan (next report due May 2014).

C. Reputation and Rankings

The GPMB is widely known in the southeast US and along the eastern seaboard, and, anecdotally, it has a strong reputation for producing graduates that are well prepared for research jobs and doctoral programs. There are few rankings available for programs in marine biology, and also few for masters-level programs in general, so it is difficult to find objective means to compare our program to others in the region or nationally. However, in the past few years, the GPMB has been ranked in the top 10 among marine biology programs by marinebiologyschools.net. On this list, the GPMB ranks behind the following schools in order: Harvard, Cornell, Univeristy of Miami, UC-Santa Barbara, UC-Berkeley, Duke, Boston Univeristy, the University of Washington, and Texas A&M

University. It is important to note that the other 9 schools on the list also grant to the PhD degree.

IX. CONCLUSIONS

Evidence from this Self Study indicates that steady improvements have been realized over the past ten years in several key components of the program. A summary of the status of the GPMB since the last review (2007) include:

1. The number of students with full-time graduate student funding remains high. For instance in FY '12-'13, we were able to support 44 of 46 (96%) of students in the academic year (this excludes 6 students that did not ask for assistance due to outside jobs). Of these 46 students 43 (93 %) received full-year support (i.e., also some summer funding).

2. Internal (through College of Charleston) fellowship/scholarship funding has increased from approximately $8500 in 2000 to $72,000 for 2006/2007, to $113,000 for 2013.

3. Application numbers have reached all time highs, peaking at 121 for Fall 2013.

4. Overall size of the GPMB has held steady at ~ 50 enrolled students in the Fall of the year. Because we try to ensure support for all students, program size is largely dictated by the number of available assistantships. Although, RA (and NWS) availability has dropped in recent years, the difference has been partially compensated for by a combination of small increases in fellowships obtained by individual students (e.g., NSF, Fulbright), GAs, and TAs.

5. Time to graduation for the MS degree has dropped to approximately three years, down from > 4 years before 2004. However, little additional progress has been realized since our last Self Study in 2007.

6. The recently funded new classroom/dormitory facility at the Grice Marine Lab will be the first significant addition to the College of Charleston facilities at Fort Johnson since 1977 when the new portion of the current lab was constructed.

7. The current number of College of Charleston Biology Dept. roster (36) faculty in the GPMB has increased from the 31 roster faculty at the time of the last Self Study in 2007. Numbers of adjunct fauclty have roughly held steady (78 today vs. 82 in 2007).

8. The Marine Genomics joint initiative at the Fort Johnson Marine Science complex led by the College of Charleston and The Medical University of South Carolina has received continued funding from the state legislature. Three new Biology faculty members were hired in this area, in addition to the endowed chair (Dr. Louis Guillette) at MUSC, who interacts heavily with our program.

9. Several new elective courses have been formally added to the GPMB curriculum (Biology of Coral Reefs, Bioinformatics, Introduction to Genomics (pending final approval)), or are currently being offered on trial basis (Vertebrate Genome Biology, Marine Algal & Microbial Biology). Many of these new courses support the marine genomics initiative.

9. The GPMB curriculum has been extensively reviewed and was determined to be appropriate and satisfactory to the majority of faculty, alumni, and current students.

10. The Research Colloquium, begun in 1999, has continued to grow and has been a spectacular success. It has become a focal point for marine research for the Fort Johnson Marine Center.

11. GPMB students participate in a wide aray of outreach and service activities and genrally enjoy a solid sense of community within and among class cohorts.

X. CHALLENGES AND OPPORTUNITIES

The following list of "Challenges and Opportunities" has been raised by the past and current GPMB program directors (Owens and Plante) as a way to initiate a full discussion of options. We believe these are potential focal areas of concern in the long-term goal of becoming **the pre-eminent MS level marine biology program** in the country.

1. **Recruiting**. Although the GPMB has been receiving record numbers of applicants and we have seen a yield in the 50-82% range, we still struggle with landing those at the very top of our applicant pool. Our inability to attract highly qualified minority applicants, especially African-Americans, remains a major hurdle. Many students inform us that they choose other programs for financial reasons. With better financial support, we believe that we could both inprove the overall yield and increase minority representation. Specifically, scholarships that would effectively provide tuition waivers would make us financially competitive with any Masters-only program in the country and most PhD programs. One to two significant scholarships earmarked for under-represented students are also needed to be successful in recruiting qualified African-American and other minority applicants.

2. **Doctoral Program and MUSC merger.** For several years the College has been debating whether a few select doctoral programs should be initiated, including in marine biology. Potentially relevant to this idea, in February 2014 a bill was introduced to the SC legislature that would merge the College of Charleston and the Medical University of South Carolina (MUSC). The intent of this action is to produce a comprehensive research university in Charleston, which would certainly favor new doctoral programs. These options are still being debated, but clearly adding a doctoral program in marine biology would present significant challenges and opportunities to the GPMB. Biology department and other College faculty are divided on the issue. To briefly summarize, arguments against include 1) concerns about adequate financial support (assistantships, tuition waivers), 2) inadequate infrastructure for grants management, 3) cultural clashes between individuals (or whole departments) that do or don't work with doctoral students, and 4) inadequate faculty and teaching releases to garner sufficient research support (esp. RAs). Arguments in favor include 1) enhanced intellectual culture, including more mentoring for masters and undergraduate students, 2) demonstrated need within the community, especially among our Fort Johnson partners and our own MS students, and 3) good physical resources, including facilities and faculty at our partner institutions, and our physical location.

3. **Stipend levels, tuition waivers, and benefits.** In 2009, the College raised the basic TA stipend levels to $16,000/9 months from the previous $13,300 (TA, RA). Most RAs currently lag the $16,000 level but are hoped to increase to the TA level as new grant proposals are funded. The stipend increase initially aided our ability to compete for recruits on financial grounds, although the passage of 5 years has likely eroded that effect to some degree. The current stipend levels do make it difficult for some students to get by in the expensive Charleston area, as demonstrated by the realtively high percentage

requiring loans. Moreover, our lack of tuition waiver certainly means that our financial package compares poorly to those of most competitors offering doctoral degrees. The out-of-state tuition abatements are excellent but are coming under some pressure now as the College recruits more graduate students from other states. The abatement money pool is now drained before our Spring semester, thus it has become nearly impossible to convince spring admits to start in January without an abatement (and sometimes without a TA). If the abatement pool is not increased as graduate enrollment continues to climb, abatements will become unavailable even for some fall admits, which would greatly harm the GPMB's recruiting efforts. In addition, we currently have no insurance benefits for graduate students despite many of them being employed as teaching and research assistants.

4. **Time-to-completion.** The time it takes our students to complete a Master's degree is still an important issue. The goal of an average of three years to complete the GPMB M.S. degree is important to recruiting and fulfilling our programmatic missions. Progress has been made but there is still a tendency to over-commit students who are not experienced in developing thesis projects. The faculty must carefully assist the students in developing their projects. In addition, the loss of RAs in recent years has meant more students committing more time to other activities (e.g., TAs) rather than their thesis research. Additonal RAs (e.g., through faculty grants) and summer funding (fellowships) would help. It has also been argued that should the program begin offering doctoral degrees, the scope of MS projects likely would constrict, bringing time-to-completion down.

5. **Marine Genomics.** The Marine Genomics initiative continues to be well supported financially and three initiative-specific hires have been made. These hires have added substantially to our course offerings in the "omics" realm. However, the benefit of the Marine Genonics Fellowships to overall program recruitment has been mixed, with the number of students applying to the GPMB or accepting our offer of admission because of these fellowships fluctuating from year to year. In additon, most of the new omics courses currently suffer from low enrollment. A recent (December 2013) meeting of select GPMB faculty was convened to discuss the low-enrollment problem and to better coordinate the timing of these courses. One outome of that meeting was an agreement that more involvement of undergraduates in these courses was desirable. Further discussions are planned, but it is clear that a more defined vision for the GPMB marine genomics emphasis is needed.

6. **New Grice Lab**. Funding for a new lab has been obtained, although legislative approval for the project is still required. With the development of the improved Grice facilities it would seem appropriate to consider offering summer courses at Fort Johnson. More importantly, the new lab should provide office and research space for 3-4 faculty. This will enable additional College of Charleston biology faculty, whether extant faculty or new hires, to move to Fort Johnson. This would be crucial if the GPMB were to increase in student population size as a Masters program or add a PhD program. Improved Grice facilities will also include addressing such concerns as upgrading the

crowded computer lab, the small aquarium room, and the lack of a good “mud and specimen room” for clean-up and storage of field equipment.

Appendix 1. GPMB by-laws.

BY-LAWS, GRADUATE PROGRAM IN MARINE BIOLOGY
College of Charleston

Article I. Membership

A. The Graduate Faculty in Marine Biology
The Graduate Program in Marine Biology is one of the graduate programs of the College of Charleston (College of Charleston). Its faculty members are appointed under criteria specified below. Faculty members are drawn from a number of additional institutions in the area. By criteria and procedures established in this document, all regular marine biology graduate faculty members have co-equality in teaching, advising, and governance roles as defined herein. Members of the faculty of the Graduate Program in Marine Biology whose primary employment is not at College of Charleston hold adjunct appointments in the College of Charleston Department of Biology and are also adjunct members of the College of Charleston graduate faculty.

Members of the graduate faculty share an avowed interest in graduate instruction through scholarly research, student advising, the teaching of advanced subjects, and program development.

B. The By-Laws
These By-Laws and all amendments shall constitute the rules and regulations governing the conduct and procedures of the faculty of the Graduate program in Marine Biology in the performance of its duties. Throughout this document, “the faculty” refers to the marine biology graduate faculty and “the program” refers to the Graduate Program in Marine Biology.

C. Criteria for Selection of the Graduate Faculty
1. An earned advanced degree, in the candidate’s field.

2. Evidence of productive scholarship by the candidate. Such evidence may include two of the following:
a. Recent publications of the results of original investigations in appropriately edited journals in which manuscript contents are critically evaluated.
b. Research grant support from extramural sources.
c. Recognition of research competency by one’s peers, such as serving on national review committees. In certain cases, other specific recognized professional accomplishments may qualify a candidate for appointment.

3. Active or planned participation in graduate education such as teaching graduate courses, serving on graduate committees, and taking part in any other activities relevant to the training of graduate students.

D. Appointment to the Graduate Faculty
1. There are two categories of faculty membership. Regular members possess an earned doctorate (or the equivalent). Associate members possess a Master's degree (or the equivalent).

2. Any regular member of the faculty may recommend candidates for consideration for appointment to the faculty.

3. The Marine Biology Council shall review the credentials of all proposed appointees to the graduate faculty. Following study by the Council, appointee's names must be brought before the entire faculty for their evaluation. The Marine Biology Council (based on their vote) will make a recommendation to the entire faculty with respect to whether each appointment should be made. If a candidate is approved for appointment by the faculty, his or her name will be sent for approval to the Dean of Graduate Studies of College of Charleston by the Director of the program.

4. Appointments to the faculty are made by the President of the College of Charleston upon recommendation of the Dean of Graduate Studies of College of Charleston.

5. Appointments are for a period of three years.

6. Appointees to the graduate faculty must indicate their acceptance, in writing, to the President.

7. If a member's employment shall cease at the institution from which he or she was appointed, the faculty appointment ends. Any reappointment shall follow the procedure for initial reappointment.

E. Reappointments to the Graduate Faculty
1. Faculty having completed a term of appointment may be reappointed by demonstrating, during his or her previous term, active participation in aspects of graduate education such as: continued productive scholarship, the teaching of graduate level courses, chairing or serving on graduate student advisory or examination committees, and active participation in the business of the graduate faculty.

2. Reappointment to the faculty shall follow the same procedure and criteria as for appointment to the faculty.

F. Associate faculty
Associate faculty members possess a Master's degree (or its equivalent), but not an earned doctorate. An associate faculty member will have all the rights of regular graduate faculty members, except the right to serve as a major advisor to graduate students. Appointment, continuation of appointment and reappointment of associate faculty members will follow the same procedures as for regular faculty. Appointments will be for a term of three years.

Article II. Functions of the Graduate Faculty

Section 1
The faculty shall assume the following functions:

1. Establish and instruct such committees, standing and ad hoc, as may be necessary for the performance of its function and elect to provide for the appointment of the members of the committees.

2. The faculty shall be concerned with all matters relating to the academic program, the curriculum, admissions and continuation standards, and degree requirements. The faculty shall have the right and obligation to recommend to the President of College of Charleston needed institutional and academic studies, either directly or through appropriate committees. The President shall then transmit such recommendations to the Board of Trustees along with his or her recommendation. Final actions on such proposals shall be with the Board of Trustees.

Article III. Officers

Section 1
A. Director, Marine Biology Graduate Program

1. Appointment
The director shall be a marine scientist and shall be appointed by the President of College of Charleston. The Director shall have his or her appointment in the Biology Department of the College of Charleston. The Director shall be responsible to the appropriate administrators at College of Charleston in all matters of program administration and fiscal management.

2. Duties
The Director coordinates and administers all phases of education and research of the Program, including utilization of communal space assigned to the Program by the Marine Resources Division and such other space as may become available for the Program. He or she is responsible for the preparation of an annual report (submitted to the Dean of Graduate Studies); the preparation and control of expenditures of an annual budget of operation as approved by the appropriate College of Charleston administrators; and is the principal institutional officer for all requests in support of the Program. The Director shall be the speaker of the faculty and shall preside at all meetings of such faculty.

Section 2
B. Secretary

At its last meeting of the academic year (Spring), the faculty shall elect from among its membership a Secretary, who will serve for a term of one year and who will be responsible for performing the duties normally associated with such an office.

Section 3
C. Parliamentarian
At its last meeting of the academic year (Spring), the faculty shall elect from among its membership a Parliamentarian, who will serve for a term of one year and who will be responsible for performing the duties normally associated with such an office.

Article IV. Meetings.

Section 1
A. The faculty shall meet at least once each academic semester. Meetings shall be called by the Director. The Director or, in his or her absence, the Secretary, shall preside. In cases involving absence of both, the faculty will elect from among its membership at the meeting a Director Pro Tempore, who will preside.

B. Additional meetings may be called upon submission of a written petition of at least 20% of the faculty to the Director. Said meetings shall be held in twenty-one calendar days.

C. Thirty percent of the graduate faculty shall constitute a quorum.

D. The director, with the assistance of the Secretary, shall prepare the agenda. Faculty members may submit items for inclusion on the agenda. The faculty Secretary shall circulate written notice of the meetings together with the agenda at least one week before each regular meeting.

Section 2
In all deliberations, the faculty and its committee shall adhere to the latest edition of Robert's Rules of Order. Interpretations shall be made by the Parliamentarian.

Section 3
Motions for a roll call or a secret ballot are in order. A person must be present at the meeting in order to cast his or her ballot. Unless otherwise required by these Bylaws, motions are decided by a majority of those voting. In case of a tie, the presiding officer may cast the deciding vote.

Article V. Committees of the Faculty.

Section 1
General Regulations
A. Members of committees shall be elected for a term of one year, with the exception of members of the Marine Biology Council, who serve for three years. Members of other

committees may be reelected twice and then may serve again only after a lapse of three years.

B. A Nominating Committee, made up of four faculty members elected by the faculty at the first meeting of the academic year, submits names of candidates for all committees. Any member of the faculty may make additional nominations for committee membership from the floor.

C. All standing committees shall be elected at the last meeting of the faculty each academic year.

D. The Secretary of the faculty shall publish and distribute to all faculty members a complete list of committees upon election of the committees.

E. Within ten days after the election of new committees, the chairs of the outgoing committees shall call meetings of the new committees and transfer all records to them.

F. Each new committee shall elect a chair and a secretary and report these names to the Secretary of the faculty.

G. When a vacancy occurs between regular elections, the position shall be filled by election at the next regular meeting of the faculty.

H. Each committee shall meet and shall report to the faculty at least once each semester.

I. One student shall sit on each standing committee, except for the Admissions Committee, but they may not vote. These students shall be elected by the Marine Biology Graduate Student Association.

J. A simple majority of the committee membership shall constitute a quorum.

K. Meetings of a committee may be called by the committee chair or at least 50% of the members.

L. Committees will be elected according to the multiple selection procedure prescribed in the latest edition of Robert's Rules of Order. A majority vote is required for election to all committees. If an insufficient number of candidates received a majority to constitute a committee on the first ballot, run-off elections will be held. each run-off slate will exclude the candidate receiving the lowest number of votes in the previous balloting.

Section 2
The following committees are established:

Marine Biology Council

A. The Director of the Program is the Chair of the Marine Biology Council. In addition to the Director, this standing committee is composed of nine members, including three from the College of Charleston and six at-large members. No more than two at-large members can come from the same institution.

B. The Director cannot serve as a representative of College of Charleston. He or she will vote only in case of a tie. The Director shall chair all meetings, schedule meetings, notify all representatives, and must convene a meeting when one-third of the Council petitions in writing for a special session.

C. A member of the Council (excluding the Director) will serve a three-year term and may succeed himself or herself once in this appointment. Members are elected for staggered terms (1/3 each year).

D. The Council is responsible for reviewing the Program, including core curricula and all other courses for inclusion in the Program as recommended by the Curriculum and Academic Planning Committee. Recommendations of the Council regarding the curriculum must be submitted for action to the faculty and to the Dean of the Graduate School at the College of Charleston. Final decisions will be made by the President of College of Charleston.

E. The Council will periodically review and evaluate as appropriate the curriculum and requirements so that the Program reflects the needs of the students and the community and is academically and scientifically sound. Changes recommended by the Council are subject to approval by the Faculty. Such recommendations shall be submitted to the Dean of the Graduate School at the College of Charleston for his or her approval.

F. The Marine Biology Council is also concerned with formulating long range goals related to marine biology graduate education, including reviewing the establishment of mechanisms both to accomplish these goals and to monitor their success.

G. The Marine Biology Council functions as the steering body of the marine biology graduate program and serves the interests of the program and the individual students. The Council has primary responsibility for monitoring the progress of each graduate student in the program until the student has chosen a thesis advisor and committee. the Council hears and makes recommendations upon appeals from graduate students regarding changes in status, extension of time limits, satisfaction of requirements, transfer of credits, and other similar matters. Their recommendations will become final unless appealed in accordance with appropriate student procedures at College of Charleston.

Admissions Committee

A. The Admissions Committee shall consist of eight faculty members: two from College of Charleston and six at-large. No more than three members can come from any one institution.

B. The duties of the committee shall be:

1. To review and make recommendations concerning admission procedures and policies. Admission policies must be adopted by the faculty and approved by the Dean of Graduate Studies and President of College of Charleston.
2. To review applications for admission and make decisions concerning admissions.
3. To review applications for financial assistance, assistantships and fellowships for new students and make recommendations concerning these. In many cases funds for support of new students comes from departments or agencies of the participating institutions and are designated for defined purposes (e.g., Teaching or Research Assistants). In these cases, final decisions on awards of support shall be made by the appropriate department chair or agency administrator in consultation with the Program Director.

Curriculum and Academic Planning Committee
A. The Curriculum and Academic Planning Committee shall consist of eight faculty members: two from College of Charleston and six at-large members. No more than three members can come from the same institution.

B. The duties of the Committee shall be:
1. To make recommendations to the Marine Biology Council concerning all courses, programs and changes in the graduate curriculum. No changes in the curriculum shall be presented to the Marine Biology Council without the committee's action. If approved by the Marine Biology Council, recommendations of the Curriculum and Academic Planning Committee are forwarded to the faculty for approval. Upon approval, these curriculum changes will be forwarded to the appropriate body at College of Charleston for institutional approval.

2. To review and make recommendations with regard to graduation requirements.

3. To review and make recommendations to the Marine Biology Council with regard to graduate academic requirements and programs, both existing and projected, in the light of the purposes, resources and long-range plans of the program and the needs of the students.

4. To recommend to the Marine Biology Council long-range activities and goals for the program. To this end, the committee shall:
a. gather information from such administrators, academic departments, committees, program directors, and other individuals as necessary;
b. gather necessary budgetary information for new activities and goals.

Funding and Cooperative Research Committee
A. The Funding and Cooperative Research Committee shall consist of four members, one from College of Charleston and three at-large.

B. The duties of the committee shall be:
1. To investigate sources of funding to insure continued progress toward research and academic goals.

2. To expedite cooperative sharing of facilities, personnel, and equipment among participating institutions.

Faculty-Student Relations Committee
A. The Faculty-Student Relations Committee shall consist of four faculty members. One from College of Charleston and three at-large.

B. The committee shall be responsible for orientation and introduction of all new students to available facilities and the faculty.

C. The committee shall be responsible for development and operation of a continuing scholarly seminar series.

D. The committee shall be responsible for the preparation and annual updating of a graduate student handbook.

E. The committee shall be responsible for regular interfacing with the graduate student body to maintain morale and help identify student concerns and communicate them to the faculty and to the Marine Biology Council.

Articles VI. Procedures for Amending the By-Laws.

1. Initiation: A change in the By-Laws must be proposed by a motion from a member of the faculty and seconded by another member at any regular meeting of the faculty and submitted in writing to the program Director. The Director will appoint an ad hoc amendment committee (composed of the initiating member and at least three other faculty members approved by a majority of the members present).

2. Committee Analysis: The amendment committee will study the changes proposed, prepare an analysis of the effects on the Program, and write in clear form compatible with the existing By-Laws. They will submit their report to the Director in time for it and a copy of the formal amendment to be circulated to all members of the faculty at least two weeks prior to the next official meeting of the faculty.

3. Enactment: The amendment will be read at the next meeting of the faculty and the report of the ad hoc amendment committee will be presented. The faculty will then discuss and vote on the amendment. To be enacted, an amendment must be approved by two-thirds of those voting. After final action on the amendment, the ad hoc committee is dissolved. No such amendment will be effective until approved by the Board of Trustees of College of Charleston upon recommendation by its Dean of the Graduate School and President.

Appx. 2. GPMB exit interview

Marine Biology Graduate Program

Exit Interview

What are the strengths of the Marine Biology Program?

What are the weaknesses?

Rate the overall curriculum:
Excellent Very Good Good Average Below Avg Poor

What courses were particularly useful to you? Which were not particularly useful?

What courses do you wish we had offered? If you had an opportunity to modify the program's curriculum, including course requirements, what would you do?

Did you benefit from the research component of the program? Why or why not?

How would you rate the helpfulness of the faculty:
Excellent Very Good Good Average Below Avg Poor

Please rate the performance of your committee:
Excellent Very Good Good Average Below Avg Poor

Appx. 3. GPMB assessment plan

Program(s) Assessment Report FY 2013
Program: Marine Biology - MS

College of Charleston

Academic Affairs

School of Sciences and Mathematics

Biology

Marine Biology - MS

Marine Biology - MS

Program Name: Marine Biology
Program Type: Graduate Degree
Program Assessment Coordinator: Professor (Plante, Craig)
Coordinator's Email: plantec@cofc.edu
Coordinator's Phone: 953-9187
Coordinator's Office Address: #104 Grice Marine Laboratory
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael)
Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization: 2007
Date of next program review: 2013
Program/Department Mission Statement
The ***purpose*** of the Graduate Program in Marine Biology is to offer students a well-rounded, Master's degree level of education in marine biology that will allow graduates to pursue further study or professional employment in marine science. The curriculum is designed to provide students with breadth in their education, while focused research projects develop depth.
Unit or School Mission

Biology Dept: The role of the Biology Department is to provide students with an understanding of the science of living systems within the context of a liberal arts education. The primary mission of the Department – as is true of the College – is excellence in undergraduate education; to this end, we continuously enhance and revise a curriculum that emphasizes scientific knowledge, theory and process across levels of biological organization and taxonomic diversity. Our goal is to prepare our majors for careers and/or post-graduate study in biology, and non-majors with an understanding and appreciation for the field of biology, as well as its

relevance and application to modern life. In addition to this commitment to excellence in undergraduate education, the Department has a strong culture of valuing research; faculty members maintain active research programs, support two College of Charleston graduate programs, apply their expertise to local and regional issues, and publish in national and international journals.

Graduate School: The Graduate School of the College of Charleston seeks to offer graduate degrees and certificate programs that take advantage of the unique opportunities provided by the people, institutions, and environment of the South Carolina Low Country and that offer the specialized knowledge and training sought by professionals living and working in the region. The graduate programs provide a quality driven, student-oriented education in an atmosphere that encourages student and faculty diversity, inclusiveness, and equity.

Comments and Attachments

The program requirements for the GPMB are more advanced in academic content than undergraduate program in the same field. Major requirements fall under two categories:

1. Coursework

Content and rigor of coursework are in part set by the extensive set of pre-requisite courses for admission into the Program. These include: two courses of college physics, calculus, chemistry through organic (2 courses) or analytical, and 20+ semester hours of upper division biology courses, including a course in ecology and one in cell or molecular biology. These courses are designed to ensure that incoming students are prepared to immediately take our 4 core courses. Those students with abundant undergraduate or graduate coursework that overlaps with any of our core courses can opt out of those classes to avoid redundancy and replace them with elective courses. The GPMB has a Curriculum and Academic Planning (CAP) committee that consists of 8 GPMB faculty and one student representative. The committee is charged with reviewing the curriculum and recommending courses modifications. Ultimately, the rigor and relevance of the coursework, especially that of the “core” courses, is evaluated during the students’ oral comprehensive exams.

1. Research thesis

All students in the GPMB must conduct research and defend their project orally, and submit an approved written thesis. The thesis provides the clearest evidence that the Program is more complex and rigorous than marine biology undergraduate programs. Through the thesis research, students demonstrate not only the ability to gather broad knowledge in

marine science and more specific knowledge in their specialty from coursework, but also to analyze and evaluate information from the literature and other sources, create new information with their own research, and, finally, to effectively communicate that information to other scientists. Both the oral defense and written thesis are evaluated by the student's thesis committee, which consists of 4-5 members. The committee mainly consists of GPMB regular and adjunct faculty, with the option that one member can be non-faculty. Faculty consist of both regular (College of Charleston) and adjunct (non-CofC) faculty. Adjunct faculty are primarily affiliated with our Fort Johnson partners (NOAA, SC-DNR, HML, NIST, and MUSC).

-  Marine Bio Report and Supporting Docs
-  Program Report Rubric MBIO MS 2013

Related Items
There are no related items.

1: Broad Knowledge

Program Goal or SLO

Acquire broad knowledge in marine biology and related sciences. Program graduates obtain a strong foundation of knowledge of 1) the biology of marine organisms (across all levels of biological organization and taxonomic diversity), 2) the ocean environment, and 3) the practice of science. (See attached curriculum map)

Assessment Method / Performance Expected

Knowledge base is tested through an oral comprehensive exam. All students are tested by their thesis committee and exam chair within 30 days of completing the core curriculum. At least 90% of students should average “good” or better over all subject areas of the exam (see attached rubric).

Assessment Results

All fourteen students that entered the GPMB in 2011 have completed the oral exam. Twelve of 14 (86%) averaged > 3.0 ("good" on the 1-5 scale) on their first attempt at the exam. Two students failed the exam but both were granted a re-take opportunity. Both students passed their re-take exam and are still in the program. Using the final (re-take) scores, 13 of 14

(93%) averaged > 3.0 for the five areas of assessment. The mean composite score was 3.55, ranging between 2.66 - 4.40. Mean scores for each area of assessment (General Biology, Ecology, Sub-organismal Biology, Oceanography, and Statistics & Experimental Design) were all above 3 (3.44-3.69).

The oral comprehensive exams for the 2012 class are currently underway. Of the 14 new students, 6 have taken and passed the exam. All have averaged above 3.0 in each area of assessment. The remaining 8 students are scheduled to take the exam in June or early July 2013.

Use of Results

Because mean scores for each area of assessment (General Biology, Ecology, Sub-organismal Biology, Oceanography, and Statistics & Experimental Design) were all above 3 and showed little variation (3.44-3.69 with mean of 3.55), there is little indication of a weakness in a specific area of instruction. The goal of "At least 90% of students should average 'good' or better over all subject areas of the exam" was either just missed (86%) or slightly exceeded (93%), depending on whether re-take or original scores for students initially failing the exam are used in the calculation.

To date, these results have been reviewed by the Program Director and the GPMB Admin Coordinator. The results will also be presented to the Marine Biology Council, the steering body of the GPMB, for discussion. This discussion is planned for July 2013, after we have compiled the results for a second year class of students.

Budget Changes
No changes
Comments and Attachments

-  curriculum map.doc
-  oral exam eval sheet

Related Items

2: Develop nationally recognized graduate programs.

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.

10: Pursue national recognition for the College of Charleston's personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

2: Communication

Program Goal or SLO

Demonstrate ability to clearly and effectively communicate scientific results. New knowledge acquired through the scientific process has little meaning without effective communication to other scientists, resource managers and other decision-makers, and the public. (See attached curriculum map)

Assessment Method / Performance Expected

Students present their proposed research and their research results in the form of a scientific poster and oral presentation, resp., at our annual GPMB student research colloquium. All students should present at least one each poster and talk while in the program. The Colloquium is an annual event, occurring each Fall. At least 90% of students should average a "good" or better score over all areas of assessment (see attached rubrics for poster and talks). Two separate panels of judges, mostly derived from GPMB regular or adjunct faculty, will score the posters and oral presentations.

Assessment Results

Beginning second- and third-year GPMB students presented their research in scientific posters and oral presentations, respectively, at our annual student research colloquium on September 28-29, 2012.

Sixteen of 16 (100%) of students presenting posters achieved a composite (average of 10 areas of assessment on content or presentation style; see scoring rubric) > 3.0. Composite scores of individual students ranged between 3.39-4.63. Mean scores of all students for the various areas of assessment ranged between 3.52 ("Data/Results") to 4.66 ("Clarity of Presentation").

Sixteen of 16 (100%) of students presenting talks also obtained a composite (average of 10 areas of assessment on content or presentation style; see scoring rubric) > 3.0. Composite scores of individual students ranged between 3.50-4.44. Mean scores of all students for the various areas of assessment ranged between 3.71 ("Significance") and 4.22 ("Introduction").

Use of Results

To date, these results have been reviewed by the Program Director and the GPMB Admin Coordinator. At this time no deficiencies in the area of scientific communication are apparent. Students and alumni of the GPMB are widely known to possess superior communication abilities, so these results confirmed our expectations. However, part of the training in scientific communication, particularly in constructing posters, is currently provided in the first-year seminar course, Biology 621. This seminar has recently been reviewed by the GPMB's Curriculum and Academic Planning committee, and has been identified for possible deletion from the curriculum. If this comes to pass, it will be important to closely monitor the students' performance in poster presentations in the coming years and compare to these 2012-13 results.

These results will also be presented to the Marine Biology council, the steering body of the GPMB, likely at our July 2013 meeting. Given the results of the first assessment, we likely will discuss the assessment goal, and whether the expectations should be elevated.

Budget Changes
No changes
Comments and Attachments

-  oral presentation rubric
-  poster eval form

Related Items
 **2: Develop nationally recognized graduate programs.**

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.

5: Enhance co-curricular and extracurricular programs for the holistic education of students.

8: Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.

10: Pursue national recognition for the College of Charleston's personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Appx. 4. Thesis portion (Goal #3) added to 2013 GPMB assessment plan.

Goal/SLO Number:
3
Title:
Research Thesis
Start:
7/1/2013
End:
6/30/2014
Progress:

Ongoing
Responsible Roles:

Role

Professor (Craig Plante)

Providing Program:
Marine Biology - MS

Program Goal or SLO
All students must conduct a marine biology research project, and orally defend their work and submit a written thesis. Both steps must be approved by their thesis committee. Publication in the peer-reviewed literature is one measure of the quality of the thesis research. Students in the program should conduct important and novel research, striving to contribute to the foundation of knowledge through publication in peer-reviewed journals.

Assessment Method / Performance Expected
Seventy-five percent (75%) of program graduates should publish their thesis research findings in peer-reviewed journals within three years of graduation.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Items This Program Goal or Student Learning Outcome Supports

Type	Number	Name	Start Date	End Date	Provider	Progress
Strategic Initiative	2	Develop nationally recognized graduate programs.	07/01/2013	06/30/2014	College of Charleston	
Strategic Initiative	4	Recruit, enroll and retain an academically	07/01/2013	06/30/2014	College of Charleston	

Type	Number	Name	Start Date	End Date	Provider	Progress
		distinguished, well-prepared and diverse student body.				
Strategic Initiative	8	Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.	07/01/2013	06/30/2014	College of Charleston	
Strategic Initiative	10	Pursue national recognition for the College of Charleston's personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.	07/01/2013	06/30/2014	College of Charleston	

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